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ABSTRACT

This teacher's guide contains computer programs, written in BASIC, for use in Iowa secondary school industrial arts programs. The programs were developed in two 2-week workshops by industrial arts teachers who had little or no previous experience with computers; the programs have been classroom tested and refined for publication. The programs are intended to assist teachers in initiating computer learning activities and computer-assisted classroom/laboratory management. Programs cover the following topics: general (mathematics and measurement drills), construction, energy and power, graphic communication, manufacturing, and instructional management. Each program contains an introduction which explains the use of the program, and the name and address of the program author. (KC)

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IOWA HANDBOOK

OF

BASIC COMPUTER PROGRAMS

FOR

INDUSTRIAL ARTS

Edited by

Ronald D. Bro, Professor
Department of Industrial Technology
University of Northern Iowa

for

IOWA DEPARTMENT OF PUBLIC INSTRUCTION

CE 033 265

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PREFACE

This collection of programs represent the work of participants in two two-week workshops at the University of Northern Iowa. The workshops were sponsored by the Iowa Department of Public Instruction. All of the participants were industrial arts teachers who had little or no previous experience with computers. Programs written during the first summer workshop were used by the participants in their classrooms during the following year. The programs were then refined and additional ones written during the second workshop.

The purpose of this project was to foster implementation of computers in public school industrial arts programs. The variety of programs contained here-in show that computer technology has many useful applications in industrial arts. It is a powerful tool when used appropriately to supplement instruction and assist the instructor. It is hoped that this selection of programs will assist teachers in initiating computer learning activities and computer assisted classroom/laboratory management.

Programs of interest will need to be entered directly at the terminal of the computer. Tapes or disc of programs are not available. It is anticipated that the teacher will have access to manuals accompanying their computer which describe the operational and programming procedures for their system. Some may also have consultants who can assist them in getting started. These programs are all written in BASIC but slight modifications will be needed for brands of computers different from the one for which the program was written. If you have difficulty in interpreting a program, it is suggested that you contact the author of the particular program for assistance.

Ronald Bro, Workshop
Director and Handbook Editor

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PROGRAMS

GENERAL

8

FORMAT FOR A MATCHING QUIZ

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Marvin Berg
Fort Dodge Senior High School
Fort Dodge, Iowa

APPLICATION: General

INTRODUCTION: This program is a format for a matching quiz of 10 items. Although the program contains 130 statements, the choices and questions may be changed by re-writing 20 lines. The lines which need to be changed are those with the items and others that contain the questions. The quiz is also scored.

This example is a matching quiz for electrical units of the volt, amp, ohm, watt, henry, farad, joule and coulomb. It would be appropriate for a study of the relationship of all of the above terms in either electricity or electronics courses.

THE PROGRAM:

```
 10 PRINT TAB(30)"ELECTRICAL TERMS"
 20 PRINT LIN(1)
 30 PRINT TAB(10)"THIS PROGRAM IS A TEST OF YOUR UNDERSTANDING
       OF THE"
 40 PRINT TAB(5)"DEFINITIONS OF VARIOUS UNITS USED IN ELECTRICAL
       THEORY."
 50 PRINT TAB(5)"MATCH THE NUMBER OF EACH OF THE FOLLOWING
       UNITS WITH"
 60 PRINT TAB(5)"THE MORE COMMONLY USED TERM.  THE SYMBOL **
       INDICATES"
 70 PRINT TAB(5)"THE SQUARE OF THE UNIT."
 80 PRINT LIN(1)
 90 PRINT TAB(10)"1.  COULOMB/SEC"
100 PRINT TAB(10)"2.  JOULE/SEC"
110 PRINT TAB(10)"3.  JOULE/COULOMB"
120 PRINT TAB(10)"4.  COULOMB**/JOULE-SEC"
130 PRINT TAB(10)"5.  JOULE/COULOMB**/SEC**"
140 PRINT TAB(10)"6.  JOULE-SEC/COULOMB**"
150 PRINT TAB(10)"7.  COULOMB"
160 PRINT TAB(10)"8.  NEWTON-METER"
170 PRINT TAB(10)"9.  COULOMB**/JOULE"
180 PRINT LIN(1)
190 PRINT TAB(8)"1.  THE UNIT OF A VOLT IS DEFINED AS ";
200 INPUT E
210 IF E <> 3 THEN 240
220 LET S=1
230 GOTO 250
240 LET S=0
250 PRINT TAB(8)"2.  THE UNIT OF AN OHM IS ";
```

```
260 INPUT R
270 IF R <>6 THEN 300
280 LET T=1
290 GOTO 310
300 LET T=0
310 PRINT TAB(8)"3. THE UNIT OF A WATT IS ";
320 INPUT P
330 IF P<>2 THEN 360
340 LET U=1
350 GOTO 370
360 LET U=0
370 PRINT TAB(8)"4. THE UNIT OF AN AMP IS ";
380 INPUT A
390 IF A<>1 THEN 420
400 LET V=1
410 GOTO 430
420 LET V=0
430 PRINT TAB(8)"5. THE UNIT FOR CONDUCTANCE IS ";
440 INPUT C
450 IF C<>4 THEN 480
460 LET C=1
470 GOTO 490
480 LET C=0
490 PRINT TAB(8)"6. THE DEFINITION FOR A JOULE IS ";
500 INPUT E
510 IF E<>8 THEN 540
520 LET E=1
530 GOTO 550
540 LET E=0
550 PRINT TAB(8)"7. A FARAD IS IDENTIFIED AS ";
560 INPUT F
570 IF F<>9 THEN 600
580 LET F=1
590 GOTO 610
600 LET F=0
610 PRINT TAB(8)"8. KNOWN AS THE UNIT OF CHARGE ";
620 INPUT Q
630 IF Q<>7 THEN 660
640 LET Q=1
650 GOTO 670
660 LET Q=0
670 PRINT TAB(8) "9. THE UNIT OF THE HENRY IS ";
680 INPUT H
690 IF H<>5 THEN 720
700 LET H=1
710 GOTO 730
720 LET H=0
730 PRINT TAB(8)"10. THE UNIT OF ADMITTANCE IS";
740 INPUT A
750 IF A<>4 THEN 780
760 LET A=1
770 GOTO 790
```

```
780 LET A=0
790 PRINT LIN(1)
800 LET J=S+T+U+V+C+E+F+Q+H+A
810 IF J=10 THEN 930
820 IF J=9 THEN 950
830 IF J=8 THEN 970
840 IF J=7 THEN 990
850 IF J=6 THEN 1010
860 IF J=5 THEN 1030
870 IF J=4 THEN 1050
890 IF J=3 THEN 1070
900 IF J=2 THEN 1130
910 IF J=1 THEN 1150
920 IF J=0 THEN 1170
930 PRINT TAB(8)"VERY GOOD.  YOU MATCHED ALL TERMS CORRECTLY."
940 GOTO 1180
950 PRINT TAB(8)"YOU MATCHED 9 TERMS CORRECTLY."
960 GOTO 1180
970 PRINT TAB(8)"YOU MATCHED 8 TERMS CORRECTLY."
980 GOTO 1180
990 PRINT TAB(8)"YOU MATCHED 7 UNITS CORRECTLY."
1000 GOTO 1180
1010 PRINT TAB(8)"YOU MATCHED 6 UNITS CORRECTLY."
1020 GOTO 1180
1030 PRINT TAB(8)"YOU MATCHED 5 UNITS CORRECTLY."
1040 GOTO 1180
1050 PRINT TAB(8)"YOU MATCHED 4 UNITS CORRECTLY."
1060 GOTO 1180
1070 PRINT TAB(8)"YOUR SCORE WAS 3 CORRECT."
1080 PRINT TAB(8)"WOULD YOU LIKE TO TRY AGAIN?"
1090 DIM N$[3]
1100 INPUT N$
1110 IF N$="YES" THEN 190
1120 GOTO 1180
1130 PRINT TAB(8)"YOU MATCHED 2 UNIT CORRECTLY."
1140 GOTO 1180
1150 PRINT TAB(8) "YOUR SCORE IS 1 CORRECT."
1160 GOTO 1180
1170 PRINT TAB(8)"YOU DID NOT MATCH ANY OF THE TERMS CORRECTLY."
1180 PRINT LIN(1)
1190 PRINT TAB(8)"WOULD YOU LIKE ANOTHER SET OF QUESTIONS?";
1200 INPUT N$
1210 IF N$="YES" THEN 1240
1220 PRINT TAB(20)"HAVE A GOOD DAY."
1230 GOTO 1300
1240 PRINT LIN(1)
1250 PRINT TAB(8)"THE FOLLOWING PROGRAMS ARE AVAILABLE FOR YOU
          R USE."
1260 PRINT LIN(1)
1270 PRINT TAB(12)"RCCIR----FOR SOLVING RC CIRCUIT PROBLEMS"
1280 PRINT TAB(12)"RLCIR----FOR SOLVING RL CIRCUIT PROBLEMS"
1290 PRINT TAB(12)"LCCIR----FOR SOLVING LC CIRCUIT PROBLEMS"
1300 END
```


11

FRACTION DRILL

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Michael Garoutte
Linn-Mar Junior High School
Marion, Iowa

APPLICATIONS: General

INTRODUCTION: This program will help students in drafting, woodworking, metal, etc. that need remedial work with fractions. It is designed to give students experience working with the 1/2, 1/4, 1/8 and 1/16 fractions which in turn have applications to working with measuring instruments. This will free up the teacher for other instructional tasks.

THE PROGRAM:

```
 10 DIM A$[10],B$[10],C$[10],D$[10],E$[10],F$[10],G$[10],H$[10],I$[10]
 15 DIM J$[10],N$[15],T$[20],Q$[10],R$[5],S$[5]
 20 PRINT TAB(20)"FRACTION DRILL"
 25 PRINT TAB(20)"=============="
 30 PRINT
 35 PRINT
 40 PRINT "THIS PROGRAM IS SET UP TO HELP YOU WITH FRACTIONS
      BY PROVIDING YOU"
 45 PRINT "WITH EXPERIENCE NEEDED TO WORK WITH FRACTIONAL
      MEASUREMENTS."
 50 PRINT
 55 PRINT "YOU WILL NEED A PENCIL AND SCRATCH PAPER."
 60 PRINT "DO YOU HAVE BOTH OF THESE ITEMS";
 65 INPUT R$
 70 PRINT
 75 PRINT
 80 IF F$[1,1]="Y" THEN 145
 85 PRINT "SINCE YOU DO NOT HAVE ALL OF THE MATERIALS THAT YOU
      WILL"
 90 PRINT "NEED, PLEASE FOLLOW THESE INSTRUCTIONS:"
 95 PRINT TAB(10)"1. GET THEM."
100 PRINT TAB(10)"2. RETURN TO THE TERMINAL."
105 PRINT TAB(10)"3. TYPE READY. (THIS WILL START THE PROGRAM)"
110 PRINT
115 PRINT
120 INPUT S$
125 IF S$="READY" THEN 135
130 GOTO 105
135 PRINT
140 PRINT
145 PRINT "WHAT IS YOUR FIRST NAME";
```

```
150 INPUT N$
155 PRINT "IT IS A PLEASURE TO MEET YOU, "N$"."
160 PRINT "YOU WILL BE WORKING WITH A 20 QUESTION DRILL."
165 PRINT "RELAX AND GOOD LUCK."
170 PRINT
175 PRINT
180 C=0
185 FOR B=1 TO 20
190 PRINT TAB(15)"#"B
195 REM**** B IS THE PROBLEM NUMBER
200 A=INT(RND(1)*3)+1
205 REM**** THE COMPUTER WILL GENERATE A NUMBER AT RANDOM
        BETWEEN 1 & 4
210 D=2 ** A
215 N=INT(RND(1)*D)+1
220 P=4-A
225 G=INT(RND(1)*P)+1
230 I=2 ** G
235 O=I*N
240 E=I*D
245 J=INT(RND(1)*5)+1
250 REM**** THE COMPUTER WILL GENERATE A NUMBER AT RANDOM
        BETWEEN 1 & 5
255 REM**** THE COMPUTER TAKES THE NUMBER GENERATED FROM
        ABOVE AND
260 REM**** SENDS THE PROGRAM TO THE CORRESPONDING NUMBER
        NUMBER BELOW.
265 GOTO J OF 270,305,340,375,410
270 PRINT TAB(20);N;"/";D;"="
275 PRINT TAB(20)" X   /"E;TAB(32)"WHAT IS THE VALUE OF X";
280 INPUT H
285 IF H=0 THEN 1040
290 GOSUB 1255
295 PRINT "THE CORRECT ANSWER IS "?
300 GOTO 1170
305 PRINT TAB(20);N;"/";D;"="
310 PRINT TAB(20);O;"/ X";TAB(33)"WHAT IS THE VALUE OF X";
315 INPUT H
320 IF H=E THEN 1040
325 GOSUB 1255
330 PRINT "THE CORRECT ANSWER IS "E
335 GOTO 1170
340 PRINT TAB(20);O;"/";E;"="
345 PRINT TAB(20)" X  /";D;TAB(32)"WHAT IS THE VALUE OF X";
350 INPUT H
355 IF H=N THEN 1040
360 GOSUB 1255
365 PRINT "THE CORRECT ANSWER IS "N
370 GOTO 1170
375 PRINT TAB(20);O;"/";E;"="
380 PRINT TAB(20);N;"/ X";TAB(33)"WHAT IS THE VALUE OF X";
385 INPUT H
```

```
390 IF H=D THEN 1040
395 GOSUB 1255
400 PRINT "THE CORRECT ANSWER IS "D
405 GOTO 1170
410 PRINT "PUT THESE FRACTIONS IN THE CORRECT ORDER STARTING
    WITH THE"
415 PRINT "SMALLEST AND GOING TO THE LARGEST.  (TYPE IN THE LET
    TER OF"
420 PRINT "THE SMALLEST FIRST, FOLLOW IT WITH A COMMA, THEN THE
    LETTER"
425 PRINT "OF THE SECOND, FOLLOW IT WITH A COMMA, ETC.)"
430 G=INT(RND(1)*10)+1
435 REM**** THE COMPUTER WILL GENERATE A NUMBER AT RANDOM
    BETWEEN 1 & 10
440 GOTO G OF 445,505,560,620,680,740,800,860,920,980
445 PRINT TAB(20)"(A) 1/2"
450 PRINT TAB(20)"(B) 3/4"
455 PRINT TAB(20)"(C) 1/4"
460 PRINT TAB(20)"(D) 5/16"
465 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
470 INPUT A$
475 IF A$="C,D,A,B" THEN 1040
480 IF A$="C,D,A,B." THEN 1040
485 IF A$="C,D,A,B," THEN 1040
490 GOSUB 1255
495 PRINT "THE CORRECT ORDER IS:  C,D,A,B."
500 GOTO 1170
505 PRINT TAB(20)"(A) 2/4"
507 PRINT TAB(20)"(B) 1/4"
510 PRINT TAB(20)"(C) 1/8"
515 PRINT TAB(20)"(D) 2/2"
520 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
525 INPUT B$
530 IF B$="C,B,A,D" THEN 1040
535 IF B$="C,B,A,D." THEN 1040
540 IF B$="C,B,A,D," THEN 1040
545 GOSUB 1255
550 PRINT "THE CORRECT ORDER IS:  C,B,A,D."
555 GOTO 1170
560 PRINT TAB(20)"(A) 5/8"
565 PRINT TAB(20)"(B) 2/4"
570 PRINT TAB(20)"(C) 7/16"
575 PRINT TAB(20)"(D) 1/4"
580 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
585 INPUT C$
590 IF C$="D,C,B,A" THEN 1040
595 IF C$="D,C,B,A." THEN 1040
600 IF C$="D,C,B,A," THEN 1040
605 GOSUB 1255
```

```
610 PRINT "THE CORRECT ORDER IS:  D,C,B,A."
615 GOTO 1170
620 PRINT TAB(20)"(A) 5/16"
625 PRINT TAB(20)"(B) 1/4"
630 PRINT TAB(20)"(C) 3/16"
635 PRINT TAB(20)"(D) 7/8"
640 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
645 INPUT D$
650 IF D$="C,B,A,D" THEN 1040
655 IF D$="C,B,A,D." THEN 1040
660 IF D$="C,B,A,D," THEN 1040
665 GOSUB 1255
6  PRINT "THE CORRECT ORDER IS:  C,B,A,D."
6  GOTO 1170
680 PRINT TAB(20)"(A) 1/8"
685 PRINT TAB(20)"(B) 5/8"
690 PRINT TAB(20)"(C) 1/4"
695 PRINT TAB(20)"(D) 8/16"
700 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
705 INPUT E$
710 IF E$="A,C,D,B" THEN 1040
715 IF E$="A,C,D,B." THEN 1040
720 IF E$="A,C,D,B," THEN 1040
725 GOSUB 1255
730 PRINT "THE CORRECT ORDER IS:  A,C,D,B."
735 GOTO 1170
740 PRINT TAB(20)"(A) 15/16"
745 PRINT TAB(20)"(B) 4/8"
750 PRINT TAB(20)"(C) 1/4"
755 PRINT TAB(20)"(D) 3.8"
760 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
765 INPUT F$
770 IF F$="C,D,B,A" THEN 1040
775 IF F$="C,D,B,A." THEN 1040
780 IF F$="C,D,B,A," THEN 1040
785 GOSUB 1255
790 PRINT "THE CORRECT ORDER IS:  C,D,B,A."
795 GOTO 1170
800 PRINT TAB( 0)"(A) 7/8"
805 PRINT TAB(20)"(B) 3/4"
810 PRINT TAB 20)"(C) 11/16"
815 PRINT TAB(20)"(D) 4/8"
820 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
825 INPUT G$
830 IF G$="D,C,B,A" THEN 1040
835 IF G$="D,C,B,A." THEN 1040
840 IF G$="D,C,B,A," THEN 1040
845 GOSUB 1255
850 PRINT "THE CORRECT ORDER IS:  D,C,B,A."
855 GOTO 1170
860 PRINT TAB(20)"(A) 3/4"
865 PRINT TAB(20)"(B) 3/16"
```

```
870 PRINT TAB(20)"(C) 3/8"
875 PRINT TAB(20)"(D) 1/2"
880 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
885 INPUT H$
890 IF H$="B,C,D,A" THEN 1040
895 IF H$="B,C,D,A." THEN 1040
900 IF H$="B,C,D,A," THEN 1040
905 GOSUB 1255
910 PRINT "THE CORRECT ORDER IS:  B,C,D,A."
915 GOTO 1170
920 PRINT TAB(20)"(A) 1/16"
925 PRINT TAB(20)"(B) 1/8"
930 PRINT TAB(20)"(C) 1/4"
935 PRINT TAB(20)"(D) 1/2"
940 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
945 INPUT I$
950 IF I$="A,B,C,D" THEN 1040
955 IF I$="A,B,C,D." THEN 1040
960 IF I$="A,B,C,D," THEN 1040
965 GOSUB 1255
970 PRINT "THE CORRECT ORDER IS:  A,B,C,D."
975 GOTO 1170
980 PRINT TAB(20)"(A) 13/16"
985 PRINT TAB(20)"(B) 3/8"
990 PRINT TAB(20)"(C) 5/16"
995 PRINT TAB(20)"(D) 7/8"
1000 PRINT TAB(33)"WHAT IS THE CORRECT ORDER";
1005 INPUT J$
1010 IF J$="C,B,A,D" THEN 1040
1015 IF J$="C,B,A,D." THEN 1040
1020 IF J$="C,B,A,D," THEN 1040
1025 GOSUB 1255
1030 PRINT "THE CORRECT ORDER IS:  C,B,A,D."
1035 GOTO 1170
1040 M=INT(RND(1)*10)+1
1045 REM**** THE COMPUTER WILL GENERATE A NUMBER AT RANDOM
       BETWEEN 1 & 10
1050 GOTO M OF 1065,1075,1085,1095,1105,1115,1125,1135,1145,1155
1055 REM**** THE FOLLOWING ARE TEN POSITIVE STATEMENTS WHICH
       CAN BE GIVEN
1060 REM**** BY THE COMPUTER IF THE STUDENT GETS THE PROBLEM
       CORRECT.
1065 PRINT "NICE JOB, "N$"!"
1070 GOTO 1165
1075 PRINT "WHAT A STAR!!"  "WHAT A STAR!!"  "WHAT A STAR!!"
1080 GOTO 1165
1085 PRINT "WOW, I'VE GOT A SMART ONE!!!!!!!!!"
1090 GOTO 1165
1095 PRINT "YOUR TEACHER MUST BE PRETTY SMART TO GET YOU TO SEE
       THAT ONE."
1100 GOTO 1165
1105 PRINT"L U C K Y ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !"
```

```
1110 GOTO 1165
1115 PRINT "GREAT, "N$", UNBELIEVABLE, BUT GREAT!"
1120 GOTO 1165
1125 PRINT "THE WIZZ KID STRIKES AGAIN."
1130 GOTO 1165
1135 PRINT "********** FANTASTIC **********"
1140 GOTO 1165
1145 PRINT "GEE, WHAT A BRAIN."
1150 GOTO 1165
1155 PRINT "IT'S A PLEASURE WORKING FOR SOMEONE WHO GETS THEM
     RIGHT. "N$
1160 GOTO 1165
1165 C=C+1
1170 NEXT B
1175 W=20-C
1180 Y=C/20
1185 I=(INT(Y*1000+.5)/1000)*100
1190 PRINT
1195 PRINT "+++++++++++++++++++++++++++++++++++"
1200 PRINT
1205 PRINT TAB(3);N$"---YOUR SCORE IS:"
1210 PRINT TAB(9)"NUMBER "TAB(24)"NUMBER"
1215 PRINT TAB(9)"WRONG"TAB(24)"RIGHT"TAB(39) "PERCENT"
1220 PRINT TAB(9);W;TAB(24);C;TAB(39);I
1225 PRINT
1230 PRINT "+++++++++++++++++++++++++++++++++++"
1235 PRINT
1240 PRINT "HAVE YOUR TEACHER TAKE A LOOK AT THIS SO YOU WILL
     GET CREDIT."
1245 PRINT
1250 GOTO 1335
1255 Q=INT(RND(1)*5)+1
1260 REM**** THE COMPUTER WILL GENERATE A NUMBER AT RANDOM
     BETWEEN 1 & 5
1265 GOTO Q OF 1280,1290,1300,1310,1320
1270 REM**** THE FOLLOWING ARE FIVE NEGATIVE STATEMENTS WHICH
     CAN BE GIVEN
1275 REM**** BY THE COMPUTER IF THE STUDENT GETS THE PROBLEM
     WRONG.
1280 PRINT "I'M SORRY, "N$", YOU MISSED THAT ONE."
1285 GOTO 1325
1290 PRINT "NOT BAD, NOT RIGHT BUT NOT BAD."
1295 GOTO 1325
1300 PRINT "YOUR TEACHER HAD BETTER WORK WITH YOU MORE."
1305 GOTO 1325
1310 PRINT "YOU HAVE SCORED "C" RIGHT, "N$", SO FAR, BUT THIS
     ISN'T ONE."
1315 GOTO 1325
1320 PRINT" THAT'S NOT RIGHT YOU TURKEY."
1325 RETURN
1330 GOTO 1335
1335 END
```

MEASUREMENT DRILL

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: Scott Figg
J. B. Young Junior High
Davenport, Iowa

APPLICATION: General

INTRODUCTION: This graphics program is designed to help the student learn to read a ruler to one-sixteenth of an inch. The student must choose how many problems he/she would like to do (maximum 30). Then, give the proper answer. The computer will tell the student whether he/she was right or wrong, score the answers and print a chart of number right, number wrong, and percentage.

NOTE: Since this is a graphics program it requires the use of a shape table that must be loaded before loading the program. For more information on shape tables see Applesoft manual.

To save this program on cassette tape from the Apple, these commands must be used:

```
*0:B7 00
*0.1W 1E00.1EB7 (R)
```

To load this program into the Apple from cassette tape, these commands must be used:

```
*0:B7 00                          LOAD SHAPE
*0.1R 1E00:1EB7R (R)                TABLE

*E8:00 1E (R)                     LOCATE TABLE
*73:00 1E (R)                     PROTECT TABLE

*HIMEM:8192 (R)                   PROTECT PROGRAM

]LOAD (R)                         LOAD PROGRAM
```

* denotes machine language cursor
(R) denotes Return
] denotes Applesoft cursor

THE PROGRAM:

SHAPE TABLE

```
1E 00: 07 00 10 00 1E 00 2[illegible] 00 3B 00 5E 00 75 00 83 00 36 36 36 36 2E 20 24 24 24
       15 36 36 36 [illegible]6 36 2E 24 24 15 36 36 06 00 2D 2D 2D 2D 2D 2D 1E
       3F 3F 3F 3F 3[illegible] 0E 2D 2D 2D 2D 05 00 2D 2D 2D 2D 2D 15 3F 3F 3F
       3F 3F 3F 17 2D 2D 2D 2D 2D 2D 2D 1E 3F 3F
```

```
1E52: 3F 3F 3F 3F 0E 2D 2D 2D 2D 2D 05 00 3F 3F 3F 3F 3F 3F 27 2D 2D 2D 2D
      2D 2D 1C 3F 3F 3F 3F 3F 27 2D 05 00 36 36 36 36 3E 20 24 24 24 17
      36 36 36 00 36 36 35 36 25 24 24 24 2C 36 36 36 36 25 24 24 24 2C 36
      36 36 36 4D 09 3A 3F 3F 3F 3F 3F 77 2D
1EA3: 2D 2D 2D 2D 1E 3F 3F 3F 3F 0E 2D 2D 2D 1E 3F 3F 0E 2D 1E 07 00
```

```
 10 DIM N$(15)
 20 P = 0
 30 PRINT "HI, WHAT'S YOUR NAME";
 40 INPUT N$
 50 PRINT : PRINT : PRINT : PRINT N$
 60 PRINT "THIS IS A PROGRAM THAT WILL HELP YOU"
 70 PRINT "PRACTICE READING A RULER.  YOU MUST"
 80 PRINT "DECIDE HOW MANY MEASUREMENTS YOU"
 90 PRINT "WOULD LIKE TO DO.  THE COMPUTER WILL"
100 PRINT "KEEP A RECORD OF CORRECT ANSWERS."
110 PRINT
120 INVERSE
130 PRINT "NOTE ***** ALL FRACTIONAL ANSWERS MUST"
140 PRINT "BE REDUCED TO LOWEST TERMS.          "
150 PRINT "(EX.12/16=3/4,2/8=1/4,14/16=7/8,etc.) "
160 PRINT : PRINT
170 PRINT "FRACTIONS MUST BE ENTERED EXACTLY AS  "
180 PRINT "SHOWN BELOW.                          "
190 PRINT "     WHAT IS THE NUMERATOR?3"         "
200 PRINT TAB(28)"--                             "
210 PRINT "    WHAT IS THE DENOMINATOR?16"       "
220 PRINT : PRINT
230 NORMAL
240 PRINT "HOW MANY PROBLEMS WOULD YOU LIKE TO"
250 PRINT "DO (MAXIMUM 30) ";N$;
260 INPUT Z: PRINT : PRINT : PRINT
265 FOR Y = 1 TO Z
270 IF Z> 30THEN 1810
275 REM  *** PRINT RULER
280 HGR
285 SCALE=1
286 ROT=0
290 HCOLOR=1
300 C=135
310 FOR N=1 TO 5
320 HPLOT 10,C TO 269,C
330 C=C+1
340 NEXT N
350 B = 10:D = 14:G = 2:I = 75:F = 1:K = 134:L = 160: GOSUB 410
360 B = 90:D = 94:L = 160: GOSUB 410
370 B = 50:D = 54:G = 3:L = 80: GOSUB 410
380 B = 30:D = 34:G = 6:L = 40: GOSUB 410
390 B = 20:D = 24:G = 13:L = 20: GOSUB 410
400 GOTO 540
410 A = B
```

```
420 C = D
430 FOR E = F TO G
440 FOR H = A TO C
450 HPLOT H,I TO H,K
460 NEXT H
470 A = A + L
480 C = C + L
490 NEXT E
500 I = I + 10
510 RETURN
540 REM ***RANDOM NUMBER TO PRINT RULER NUMBERS
545 HCOLOR=6
550 X= INT ( RND (1) * 8)
555 KK =X
560 AA = 20:BB = 21:CC = 22:DD = 33:EE = 34
570 FOR W = 1 TO 2
580 ON X GOTO 600,610,620,630,640,650,660,670
590 GOSUB 690: GOSUB 700: GOSUB 710: GOSUB 730: GOSUB 740: GOSUB 750:
        GOTO 760
600 GOSUB 740: GOSUB 750: GOTO 760
610 GOSUB 700: GOSUB 710: GOSUB 720: GOSUB 730: GOSUB 740: GOTO 760
620 GOSUB 710: GOSUB 720: GOSUB 730: GOSUB 740: GOSUB 750: GOTO 760
630 GOSUB 690: GOSUB 720: GOSUB 730: GOSUB 740: GOSUB 750: GOTO 760
640 GOSUB 690: GOSUB 710: GOSUB 720: GOSUB 730: GOSUB 750: GOTO 760
650 GOSUB 690: GOSUB 700: GOSUB 720: GOSUB 730: GOSUB 750: GOTO 760
660 GOSUB 690: GOSUB 700: GOSUB 740: GOSUB 750: GOTO 760
670 GOSUB 690: GOSUB 700: GOSUB 710: GOSUB 720: GOSUB 730: GOSUB 740;
        GOSUB 750: GOTO 760
690 DRAW 1 AT AA,79: RETURN
700 DRAW 2 AT AA,90: RETURN
710 DRAW 3 AT BB,79: RETURN
720 DRAW 4 AT CC,87: RETURN
730 DRAW 5 AT DD,99: RETURN
740 DRAW 6 AT EE,79: RETURN
750 DRAW 6 AT EE,90: RETURN
760 AA = AA + 160
770 BB = BB + 160
780 CC = CC + 160
790 DD = DD + 160
800 EE = EE + 160:X = X + 1
810 NEXT W
820 REM  *** RANDOM NUMBER AND PRINT FOR ARROW
825 HCOLOR =5
830 V = INT (( RND (1) * 25) + 1)
840 FF = V * 10
850 ON V  GOTO  1650,1660,1670,1680,1690,1700,1710,1720,1730,1740,1750,1760,
        1770,1780,1790,1800,1650,1660,1670,1680,1690,1700,1710,1720,1730,
        1740
860 DRAW 7 AT FF,50
870 REM  *** ANSWER ROUTINE
880 PRINT "HOW MANY WHOLE INCHES ARE THERE";
900 INPUT T
```

```
 910 PRINT : PRINT : PRINT : PRINT
 920 PRINT : PRINT
 930 INPUT "WHAT IS THE NUMERATOR? ";Q
 940 PRINT TAB( 26)"--"
 950 INPUT "WHAT IS THE DENOMENATOR? ";R
 960 IF V>=17 THEN 990
 970 IF T = KK THEN 1010
 980 GOTO 1180
 990 KK = KK - 1: IF T = KK THEN 1010
1000 GOTO 1180
1010 ON V GOTO 1020,1030,1040,1050,1060,1070,1080,1090,1100,1110,1120,1130,
          1140,1150,1160,1170,1020,1030,1040,1050,1060,1070,1080,1090,1100,
          1110
1020 IF Q = 0 AND R = 0 THEN 1350: GOTO 1180
1030 IF Q = 1 AND R = 16 THEN 1350: GOTO 1180
1040 IF Q = 1 AND R = 8 THEN 1350: GOTO 1180
1050 IF Q = 3 AND R = 16 THEN 1350:GOTO 1180
1060 IF Q = 1 AND R = 4 THEN 1350: GOTO 1180
1070 IF Q = 5 AND R = 16 THEN 1350: GOTO 1180
1080 IF Q = 3 AND R = 8 THEN 1350: GOTO 1180
1090 IF Q = 7 AND R = 16 THEN 1350: GOTO 1180
1100 IF Q = 1 AND R = 2 THEN 1350: GOTO 1180
1110 IF Q = 9 AND R = 16 THEN 1350: GOTO 1180
1120 IF Q = 5 AND R = 8 THEN 1350: GOTO 1180
1130 IF Q = 11 AND R = 16 THEN 1350: GOTO 1180
1140 IF Q = 3 AND R = 4 THEN 1350: GOTO 1180
1150 IF Q = 13 AND R = 16 THEN 1350: GOTO 1180
1160 IF Q = 7 AND R = 8 THEN 1350: GOTO 1180
1170 IF Q = 15 AND R = 16 THEN 1350: GOTO 1180
1180 REM ***WRONG ANSWER RESPONSE
1185 FOR LL = 1 TO 100:U = PEEK ( - 16336): NEXT LL
1190 J = INT ( ( RND(0) * 2) + 1)
1200 ON J GOTO 1210,1230,1250
1210 PRINT TAB( 5)"I'M SORRY BUT YOU MISSED THAT ONE."
1220 GOTO 1260
1230 PRINT TAB( 5)"NOT BAD --- NOT RIGHT, BUT NOT BAD."
1240 GOTO 1260
1250 PRINT TAB( 5)"THAT'S NOT RIGHT YOU TURKEY!"
1260 PRINT
1270 IF T = 1 AND Q = 0 THEN 1310
1280 IF T<1 THEN 1330
1290 PRINT "THE CORRECT ANSWER IS ";KK;" ";HH;"-";JJ;" INCHES."
1300 FOR GG = 1 TO 3000:NEXT GG: GOTO 1560
1310 PRINT "THE CORRECT ANSWER IS 1 INCH."
1320 FOR GG = 1 TO 3000; NEXT GG: GOTO 1560
1330 PRINT "THE CORRECT ANSWER IS ";HH;"-";JJ;" OF AN INCH."
1340 FOR GG = 1 TO 3000: NEXT GG: GOTO 1560
1350 REM *** RIGHT ANSWER RESPONSE
1355 PRINT : PRINT : PRINT
1360 S = INT (( RND (1) * 5) + 1)
1370 ON S GOTO 1380,1400,1420,1440,1460,1480
```

```
1380 PRINT TAB( 5)"NICE JOB ON THAT ONE!"
1390 GOTO 1490
1400 PRINT "WHAT A STAR!  WHAT A STAR!  WHAT A STAR!"
1410 GOTO 1490
1420 PRINT TAB( 15)"LUCKY!!!!!!!!"
1430 GOTO 1490
1440 PRINT "THE WIZ KID STRIKES AGAIN."
1450 GOTO 1490
1460 PRINT "**********F*A*N*T*A*S*T*I*C*****\******"
1470 GOTO 1490
1480 PRINT "GEE, WHAT A BRAIN."
1490 FOR GG = 1 TO 1500: NEXT GG: PRINT : PRINT : PRINT : PRINT : PRINT
1510 REM  ** REM ERASE ARROW
1515 PRINT : PRINT : PRINT
1540 REM  *** SCORE AND RETURN
 550 P = P + 1
1560 PRINT : PRINT : PRINT : PRINT : HOR
1570 NEXT Y
1580 HOME
1585 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT :
          PRINT : PRINT
1590 T = ( INT (P/Z*1000 + .5) / 1000)*100
1600 PRINT TAB(6)"YOUR SCORE IS:  "; P;PRINT
1610 PRINT TAB(4)"NUMBER"; TAB( 19)" NUMBER"
1620 PRINT TAB(4)"WRONG "; TAB( 19)"RIGHT") TAB( 34)"PERCENT"
1630 PRINT TAB( 6)Z - P; TAB( 21)P; TAB( 36)T
1640 TEXT
1645 GOTO 1810
1650 GOTO 860
1660 HH = 1:JJ = 16: GOTO 860
1670 HH = 1:JJ = 8: GOTO 860
1680 HH = 3:JJ = 16: GOTO 860
1690 HH = 1:JJ = 4: GOTO 860
1700 HH = 5:JJ = 16: GOTO 860
1710 HH = 3:JJ = 8: GOTO 860
1720 HH = 7:JJ =16: GOTO 860
1730 HH = 1:JJ = 2: GOTO 860
1740 HH = 9:JJ = 16: GOTO 860
1750 HH = 5:JJ = 8: GOTO 860
1760 HH = 11:JJ = 16: GOTO 860
1770 HH = 3:JJ = 4: GOTO 860
1780 HH = 13:JJ = 4: GOTO 860
1790 HH = 7:JJ = 8: GOTO 860
1800 HH = 15:JJ = 16: GOTO 860
1810 Z = 30
1820 GOTO 275
1830 END
```

PROPERTIES OF A CIRCLE

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Ronald L. Ainley
Hempstead High School
Dubuque, Iowa

APPLICATION: General

INTRODUCTION: This program has application in any secondary and post-secondary courses requiring the use of circles.

It is capable of finding the following properties:
Circumference of a circle
Diameter of a circle
Area of a circle
Side of a square inscribed within a circle
Diameter of a circle circumscribed about a square
Diameter of a circle circumscribed about a hexagon
Length of an arc
Area of a sector of a circle
Side of a square having the same area as a circle
Diameter of a circle having the same area as a square

All students need to do is choose the property they wish to find and type in the number corresponding to that property. The student then supplies the data dealing with the property and the requested information will be returned.

If your students have access to a computer terminal, set up assignments dealing with lab exercises such as layout problems, individual or group projects. Properties of a circle are common in machine shop practices and layout work. It serves as an excellent application of the computer.

THE PROGRAM:

```
 10 PRINT
 20 DIM N$[30],Z$[8]
 30 PRINT "THIS IS A PROGRAM TO CALCULATE THE PROPERTIES OF CIR
        CLES."
 40 PRINT
 50 PRINT "WHAT IS YOUR NAME";
 60 INPUT N$
 70 PRINT
 80 PRINT "WHICH PROPERTY DO YOU WISH TO FIND ";N$;"?"
 90 PRINT TAB(5) "1. CIRCUMFERENCE OF A CIRCLE"
100 PRINT TAB(5) "2. DIAMETER OF A CIRCLE"
110 PRINT TAB(5)"3. SIDE OF A SQUARE INSCRIBED WITHIN A CIRCLE"
120 PRINT  TAB(5)"4. DIA. OF A CIRCLE CIRCUMSCRIBED ABOUT A
        SQUARE"
130 PRINT TAB(5)"5. DIA. OF A CIRCLE CIRCUMSCRIBED ABOUT A HEX
```

```
        AGON"
140 PRINT TAB(5)"6. LENGTH OF ARC"
150 PRINT TAB(5)"7. AREA OF A CIRCLE"
160 PRINT TAB(5)"8. AREA OF A SECTOR OF A CIRCLE"
170 PRINT TAB(5)"9. SIDE OF A SQUARE HAVING THE SAME AREA AS A
        CIRCLE"
180 PRINT TAB(5)"10. DIAMETER OF CIRCLE HAVING SAME AREA AS
        SQUARE"
190 PRINT TAB(5)"11. STOP"
200 INPUT A
210 IF A>11 THEN 80
220 GOTO A OF 230,390,540,710,870,1040,1210,1360,1520,1670,1830
230 REM *** CIRCUMFERENCE OF CIRCLE ***
240 PRINT "WHAT IS THE DIAMETER OF YOUR CIRCLE ";N$;"?"
250 PRINT
260 INPUT Z
270 LET B=Z*3.1416
280 PRINT
290 PRINT B;" IS THE CIRCUMFERENCE OF YOUR CIRCLE"
300 PRINT
310 PRINT "WANT MORE CIRCUMFERENCE INFORMATION ";N$;"?"
320 PRINT
330 PRINT "ANSWER YES OR NO"
340 INPUT T$
350 IF T$[1,1]="Y" THEN 240
360 PRINT
370 GOTO 80
380 PRINT
390 REM *** DIAMETER OF CIRCLE ***
400 PRINT "WHAT IS THE CIRCUMFERENCE OF YOUR CIRCLE ";N$;"?"
410 PRINT
420 INPUT B
430 LET F=B* 3183
440 PRINT
450 PRINT F;" IS THE DIAMETER OF YOUR CIRCLE"
460 PRINT
470 PRINT "WANT MORE DIAMETER INFORMATION ";N$;"?"
480 PRINT
490 PRINT "ANSWER YES OR NO"
500 INPUT T$
510 IF T$[1,1]="Y" THEN 400
520 PRINT
530 GOTO 80
540 REM *** SIDE OF A SQUARE INSCRIBED IN A CIRCLE ***
550 PRINT "WHAT IS THE DIAMETER OF YOUR CIRCLE ";N$;"?"
560 PRINT
570 INPUT E
580 LET C=E*.70711
590 PRINT
600 PRINT C;" IS THE LENGTH OF THE SIDE OF A SQUARE INSCRIBED IN
        THIS"
610 PRINT " CIRCLE"
620 PRINT
```

```
630 PRINT "WANT MORE SQUARE INSCRIBED WITHIN A CIRCLE"
640 PRINT "INFORMATION ";N$;"?"
650 PRINT
660 PRINT "ANSWER YES OR NO"
670 INPUT T$
680 IF T$[1,1]="Y" THEN 550
690 PRINT
700 GOTO 80
710 REM *** DIA. OF A CIRCLE CIRCUMSCRIBED ABOUT A SQUARE ***
720 PRINT "WHAT IS THE LENGTH OF A SIDE OF YOUR SQUARE ";N$;"?"
730 PRINT
740 INPUT P
750 LET X=P*1.4142
760 PRINT
770 PRINT X;" IS THE DIA. OF THE CIRCLE CIRCUMSCRIBED ABOUT THIS
      SQUARE"
780 PRINT
790 PRINT "WANT MORE DIA. OF A CIRCLE CIRCUMSCRIBED ABOUT A"
800 PRINT "SQUARE INFORMATION ";N$;"?"
810 PRINT
820 PRINT "ANSWER YES OR NO"
830 INPUT T$
840 IF T$[1,1]="Y" THEN 720
850 PRINT
860 GOTO 80
870 REM *** DIA. OF A CIRCLE CIRCUMSCRIBED ABOUT A HEXAGON ***
880 PRINT "WHAT IS THE DISTANCE ACROSS A FLAT OF YOUR HEXAGON
      ";N$;"?"
890 PRINT
900 INPUT R
910 LET Q=R*1.1547
920 PRINT
930 PRINT Q;" IS THE DIAMETER OF A CIRCLE CIRCUMSCRIBED ABOUT
      YOUR"
940 PRINT " HEXAGON"
950 PRINT
960 PRINT "WANT MORE DIA. OF CIRCLE CIRCUMSCRIBED ABOUT A HEX
      AGON"
970 PRINT " INFORMATION ";N$;"?"
980 PRINT
990 PRINT "ANSWER YES OR NO"
1000 INPUT T$
1010 IF T$[1,1]="Y" THEN 880
1020 PRINT
1030 GOTO 80
1040 REM *** LENGTH OF ARC ***
1050 PRINT "HOW MANY DEGREES ARE IN YOUR ARC ";N$;"?"
1060 PRINT
1070 INPUT W
1080 PRINT "WHAT IS THE RADIUS OF YOUR ARC ";N$;"?"
1090 PRINT
1100 INPUT Z
1110 LET T=(Z/2)*W*.0[illegible]
```

```
1120 PRINT
1130 PRINT T;" = THEN LENGTH OF ARC"
1140 PRINT
1150 PRINT "DO YOU WANT MORE ARC LENGTH INFORMATION ";N$;"?"
1160 PRINT "ANSWER YES OR NO"
1170 INPUT T$
1180 IF T$[1,1]="Y" THEN 1050
1190 PRINT
1200 GOTO 80
1210 REM *** AREA OF A CIRCLE ***
1220 PRINT "WHAT IS THE DIAMETER OF YOUR CIRCLE ";N$;"?"
1230 PRINT
1240 INPUT Z
1250 PRINT
1260 LET M=Z*Z*.7854
1270 PRINT M; " IS THE AREA OF THIS CIRCLE"
1280 PRINT
1290 PRINT "WANT MORE AREA OF CIRCLE INFORMATION ";N$;"?"
1300 PRINT
1310 PRINT "ANSWER YES OR NO"
1320 INPUT T$
1330 IF T$[1,1]="Y" THEN 1220
1340 PRINT
1350 GOTO 80
1360 REM *** AREA OF SECTOR OF A CIRCLE ***
1370 PRINT "WHAT IS THE LENGTH OF YOUR ARC ";N$;"?"
1380 INPUT L
1390 PRINT "WHAT IS THE RADIUS OF YOUR CIRCLE ";N$;"?"
1400 INPUT O
1410 LET S=D*(O/2)
1420 PRINT S;" IS THE AREA OF A SECTOR OF YOUR CIRCLE"
1430 PRINT
1440 PRINT "WANT MORE AREA OF A SECTOR OF A CIRCLE"
1450 PRINT " INFORMATION ";N$;"?"
1460 PRINT
1470 PRINT "ANSWER YES OR NO"
1480 INPUT T$
1490 IF T$[1,1]="Y" THEN 1370
1500 PRINT
1510 GOTO 80
1520 REM *** SIDE OF A SQUARE HAVING SAME AREA AS CIRCLE ***
1530 PRINT "WHAT IS THE DIAMETER OF YOUR CIRCLE ";N$;"?"
1540 INPUT K
1550 LET U=K*.8862
1560 PRINT U;" IS THE SIDE OF A SQUARE HAVING THE SAME AREA AS"
1570 PRINT "YOUR CIRCLE"
1580 PRINT
1590 PRINT "WANT MORE SIDE OF SQUARE HAVING SAME AREA AS A
     CIRCLE"
1600 PRINT "INFORMATION ";N$;"?"
1610 PRINT
```

```
1620 PRINT "ANSWER YES OR NO"
1630 INPUT T$
1640 IF T$[1,1]="Y" THEN 1530
1650 PRINT
1660 GOTO 80
1670 REM *** DIAMETER OF A CIRCLE HAVING THE SAME AREA AS A
     SQUARE ***
1680 PRINT "WHAT IS THE LENGTH OF THE SIDE OF YOUR SQUARE ";N$;
     "?"
1690 PRINT
1700 INPUT J
1710 LET H=J*1.1284
1720 PRINT H;" IS THE DIAMETER OF A CIRCLE HAVING THE SAME AREA"
1730 PRINT " AS YOUR SQUARE"
1740 PRINT
1750 PRINT "WANT MORE DIAMETER OF CIRCLE HAVING THE SAME AREA
     AS A"
1760 PRINT " SQUARE INFORMATION?"
1770 PRINT
1780 PRINT "ANSWER YES OR NO"
1790 INPUT T$
1800 IF T$[1,1]="Y" THEN 1680
1810 PRINT
1820 GOTO 80
1830 REM *** STOP ***
1840 PRINT
1850 END
```

WORD MAZE

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHORS: Staff and students
Price Laboratory School
Cedar Falls, Iowa

APPLICATION: General

INTRODUCTION: This program and many others may be available through your area education agencies. These programs are protected so a listing is not included here. Check with your computor co-ordinator to access computor library holdings in your district or AEA. Programs such as this and "Hangman" and "Scrabble" can be used in any industrial arts class to help teach vocabulary. Use the terms you wish to teach when using the programs.

Sample of "Word Maze" Program for woodworking:

This program produces three levels of random word maze puzzles. In the elementary type puzzle, the words read from left to right and top to bottom. The intermediate level puzzle adds left to right diagonals. The complex level adds reversals of the words as well.

These words are in the puzzle:

CAMBIUM LAYER	KILN DRIED	AIR DRIED
S FOUR S	S TWO S	CONFER
SHRINK	ROUGH	FIBER
CONE	LEAF	WARP
DECIDUOUS	NEEDLE	GRAIN
ROT		

CONSTRUCTION

30

BOARD FEET

COMPUTER: HP Timesharing; Apple; Informer

LANGUAGE: Microsoft BASIC; Informer BASIC; Applesoft

AUTHOR: John Lyman
Kennedy High School
Cedar Rapids, Iowa

APPLICATION: Construction; Manufacturing

INTRODUCTION: This "Board Feet" computer program will determine the actual number of board feet in a single board, given the thickness, width and length of the board in inches.

In addition, this program can serve as a beginning point for the person wishing to introduce themselves to computer use. BASIC language programing is used and can be easily followed.

A good extension to this program would be to expand the program to compute total board feet in a project as well as the total cost.

Good Luck!!!

THE PROGRAM:

```
 10 REM SAVE AS "BD-FT"
 20 PRINTTAB(9)"*** BOARD FEET ***": PRINT:PRINT
 30 PRINTTAB(8)"DETERMINE BOARD FEET"
 40 PRINTTAB(5)"KNOWING THICKNESS T, WIDTH W"
 50 PRINTTAB(8)"AND LENGTH L, ALL"
 60 PRINTTAB(9)"GIVEN IN INCHES."
 70 PRINT
 80 PRINT"THICKNESS =  ";:INPUT T
 90 IF T<=0 THEN GOTO 80
100 PRINT
110 PRINT"WIDTH =  ";: INPUT W
120 IF W<=0 THEN GOTO 110
130 PRINT
140 PRINT"LENGTH =  ";: INPUT L
150 IF L<=0 THEN GOTO 140
160 PRINT
170 LET B$ = "BOARD FEET =  "
180 LET X = T*W*L/144
190 PRINT B$;"  "X
200 END
```

CONSTRUCTION FRAMING ESTIMATION

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Don Foth
Plainfield Community School
Plainfield, Iowa

APPLICATION: Construction

INTRODUCTION: This program deals with the basics of estimating the materials needed to frame a house. It can be used to estimate the quantity of plate material, sheathing, studs and ceiling joists. To run this program effectively, the user should have a white print of the building, a pencil and some scratch paper. It is written for the senior high school and adult education levels for use in conjuction with a unit on estimating.

THE PROGRAM:

```
 10 REM ESTIMATING MATERIALS
 20 PRINT "HELLO THERE, PLEASE TYPE IN YOUR FIRST NAME"
 30 DIM N$[9]
 40 INPUT N$
 50 PRINT "HI  "N$"   THIS IS A PROGRAM IN THE AREA OF CONSTRUC
    TION"
 60 PRINT "DEALING WITH ESTIMATING THE MATERIALS NEEDED TO
    FRAME"
 70 PRINT "A HOUSE OR BUILDING."
 80 PRINT
 90 PRINT "  YOU WILL NEED SOME MEASUREMENTS BEFORE YOU
    START."
100 PRINT "YOU WILL NEED TO KNOW THE TOTAL LENGTH OF ALL YOUR"
110 PRINT "INSIDE AND OUTSIDE WALLS AND PARTITIONS FOR ESTIMA
    TING"
120 PRINT "THE PLATE MATERIAL."
130 PRINT
140 PRINT "  FOR ESTIMATING THE STUDS YOU NEED TO KNOW THE
    LENGTH"
150 PRINT "OF ALL YOUR WALLS AND ALSO THE NUMBER OF CORNERS,"
160 PRINT "INTERSECTIONS AND OPENINGS IN YOUR BUILDING."
170 PRINT
180 PRINT "  TO CALCULATE THE NUMBER OF CEILING JOISTS YOU"
190 PRINT "NEED TO KNOW WHICH WAY YOUR JOISTS ARE RUNNING TO"
200 PRINT "FEED IN THE CORRECT WALL LENGTH."
210 PRINT
220 PRINT "  TO ESTIMATE THE AMOUNT OF SHEATHING NEEDED YOU"
230 PRINT "MUST KNOW THE PERIMETER OF YOUR BUILDING AND THE
    TOTAL"
240 PRINT "AREA OF ANY LARGE OPENINGS SUCH AS DOORS AND WIN
    DOWS."
```

```
250 PRINT
260 DIM V$[9]
270 LET V$="YES"
280 DIM W$[9]
290 LET W$="NO"
300 PRINT " DO YOU HAVE THE INFORMATION NEEDED TO RUN THIS"
310 PRINT "PROGRAM?  TYPE IN YES OR NO "
320 DIM Z$[9]
330 INPUT Z$
340 IF Z$=V$ THEN 390
350 IF Z$=W$ THEN 1480
360 PRINT "PLEASE PRINT YES OR NO"
370 GOTO 330
390 PRINT "WELL IT LOOKS LIKE YOU'RE READY TO GO."
400 PRINT
400 PRINT
410 PRINT "JUST TELL ME WHAT YOU WANT TO ESTIMATE"
420 PRINT "1.  PLATE MATERIAL"
430 PRINT "2.  STUDS"
440 PRINT "3.  CEILING JOISTS"
450 PRINT "4.  SHEATHING"
460 PRINT
470 PRINT " WHAT IS YOUR CHOICE:  1,2,3,OR 4"
480 INPUT A
490 GOTO A OF 510,670,910,1020
500 REM**********FIGURING PLATE MATERIAL**********
510   PRINT "TO FIGURE THE AMOUNT OF PLATE MATERIAL NEEDED
      WE"
520 PRINT
530 PRINT "ADD THE OUTSIDE WALLS AND ANY INSIDE PARTITIONS"
540 PRINT
550 PRINT " AND MULTIPLY THIS BY 3(1 SOLE PLATE AND 2 TOP PLATES)"
560 PRINT
570 PRINT " AND TO THIS YOU ADD ON 10% AS A WASTE FACTOR."
580 PRINT
590 PRINT "WHAT IS THE TOTAL LENGTH OF ALL THE WALLS AND PARTI
      TIONS.";
600 INPUT B
610 LET C=(3*B)*.1
620 LET D=(3*B)+C
630 PRINT
640 PRINT
650 PRINT "TOTAL PLATE MATERIAL NEEDED IS ";D;" FEET."
660 GOTO 1300
670 REM**********FIGURING STUDS NEEDED**********
680 PRINT " THE TOTAL LENGTH OF ALL THE WALLS AND PARTITIONS
      IS";
690 PRINT
700 PRINT "NEEDED TO ESTIMATE THE NUMBER OF STUDS NEEDED."
710 PRINT
720 PRINT "WHEN THE STUDS ARE PLACED 16IN O.C. WE MULTIPLY"
730 PRINT
```

```
740 PRINT "THE LENGTH BY 3/4 AND THEN ADD TWO STUDS FOR EVERY"
750 PRINT
760 PRINT "CORNER, INTERSECTION AND OPENING"
770 PRINT
780 PRINT "INPUT THE TOTAL LENGTH OF ALL THE INSIDE AND OUTSIDE
    WALLS"
790 INPUT E
800 PRINT "NUMBER OF CORNERS";
810 INPUT F
820 PRINT "NUMBER OF INTERSECTIONS";
830 INPUT G
840 PRINT "NUMBER OF OPENINGS";
850 INPUT H
860 LET I=E*3/4
870 LET J=2*(F+G+H)
880 LET K=I+J
890 PRINT "THE TOTAL NUMBER OF STUDS NEEDED IS ";K
900 GOTO 1300
910 REM********** NUMBER OF CEILING JOIST NEEDED**********
920 PRINT "CEILING JOISTS ARE RELATIVELY EASY TO FIGURE.  ALL"
930 PRINT
940 PRINT "THAT IS NEEDED IS THE WALL LENGTH."
950 PRINT
960 PRINT "WHAT IS YOUR WALL LENGTH";
970 INPUT L
980 LET M=L*3/4+1
990 PRINT "THE NUMBER OF CEILING JOISTS NEEDED IS";
1000 PRINT M
1010 GOTO 1300
1020 REM**********SHEATHING**********
1030 PRINT
1040 PRINT "TO ESTIMATE THE AMOUNT OF SHEATHING NEEDED WE
    NEED TO "
1050 PRINT
1060 PRINT "TAKE THE PERIMETER OF THE BUILDING TIMES THE
    HEIGHT"
1070 PRINT
1080 PRINT "OF THE WALLS AS MEASURED FROM THE TOP OF THE FOUN
    DATION."
1090 PRINT
1100 PRINT "THEN WE MUST SUBTRACT ANY LARGE OPENINGS SUCH AS
    DOORS"
1110 PRINT
1120 PRINT "AND WINDOWS.  WALL OPENING ARE ROUNDED DOWN TO
    THE NEAREST"
1130 PRINT
1140 PRINT "FOOT.  WITH SHEATHING THE WASTE IS SLIGHT AND IS NOT
    CONSIDERED."
1150 PRINT
1160 PRINT "WHAT IS YOUR PERIMETER";
1170 INPUT O
1180 PRINT "WHAT IS YOUR WALL HEIGHT";
```

```
1190 INPUT P
1200 PRINT "WHAT IS THE AREA OF THE WALL OPENINGS";
1210 INPUT Q
1220 LET R=(O*P-Q)/36
1230 LET N=(O*P-Q)/24
1240 PRINT "THE NUMBER OF SHEETS OF 4 BY 9 FIBER BOARD NEEDED
     ARE"
1250 PRINT R" SHEETS"
1260 PRINT
1270 PRINT
1280 PRINT "THE NUMBER OF 4 BY 8 SHEETS OF SHEATHING NEEDED
     IS ";N
1290 GOTO 1300
1300 PRINT
1310 PRINT
1320 DIM Y$[6]
1330 LET Y$="YES"
1340 DIM S$[6]
1350 LET S$="NO"
1360 PRINT "DO YOU WANT MORE ESTIMATIONS      "N$;
1370 DIM T$[9]
1380 INPUT T$
1390 IF T$=Y$ THEN 400
1400 IF T$=S$ THEN 1460
1410 PRINT " PLEASE PRINT  YES  OR  NO"
1420 DIM U$[9]
1430 INPUT U$
1440 LET T$=U$
1450 GOTO 1390
1460 PRINT "GOOD BYE   "N$
1470 PRINT "I HOPE YOU FOUND THIS PROGRAM USEFUL."
1480 END
```

ROOF FRAMING

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Dale Amunson
Clarksville Community School
Clarksville, Iowa

APPLICATIONS: Construction

INTRODUCTION: This program is used to compute the length of a common rafter on a building. The program could be used by an advanced student who is knowledgeable with the terms of roof framing such as rise, run, span, ridgeboard, overhang and rafter.

It will be necessary for the student to know or have at hand the span dimension, the rise dimension per foot of run, the roof overhang length and the ridgeboard thickness if there is a ridgeboard.

This program can be used by the carpentry student, the estimator or possibly the architectural drafting students for layout allowances or estimation of materials.

THE PROGRAM:

```
 10 T2=0
 20 L2=0
 30 DIM A$[5]
 40 DIM B$[5]
 50 DIM C$[5]
 60 REM FIGURING THE LENGTH OF THE COMMON RAFTER
 70 PRINT "TO USE THIS PROGRAM YOU WILL NEED TO HAVE THE FOLLOW
    ING DATA!"
 80 PRINT
 90 PRINT "RAFTER SLOPE, RUN(1/2 SPAN), OVERHANG, THICKNESS OF
    RIDGEBOARD"
100 PRINT
110 PRINT "IF YOU NEED THESE FIGURES, LOG OFF AND OBTAIN THEM
    NOW."
120 PRINT
130 PRINT "ALL NUMBERS MUST BE GIVEN IN DECIMALS (EXAMPLE: 6IN.=
    .5 FEET)"
140 PRINT
150 PRINT "FIRST TYPE IN YOUR RISE PER 12 IN. OF RUN. DECIMALS
    PLEASE!"
160 PRINT
170 REM LET A=ALTITUDE OR RISE OF THE SLOPE
180 INPUT A
190 REM LET H=HYPOTENUSE OF THE SLOPE
200 REM LET R1=LENGTH OF THE RUN
```

```
210 LET H=A**2+144
220 PRINT
230 PRINT "WHAT IS THE RUN (1/2 SPAN) IN DECIMAL PARTS/FOOT."
240 PRINT
250 REM LET L1=LENGTH OF THE RAFTER
260 INPUT R1
270 PRINT
280 LET L1=SQR(H)*R1
290 PRINT "IS THERE AN OVERHANG? YES OR NO"
300 PRINT
310 INPUT A$
320 PRINT
330 IF A$[1,1]="Y" THEN 400
340 IF A$[1,1]="N" THEN 410
350 PRINT
360 PRINT "REMEMBER YES OR NO!"
370 PRINT
380 GOTO 310
390 PRINT
400 GOSUB 620
410 PRINT "IS THERE A RIDGEBOARD?"
420 PRINT
430 INPUT B$
440 PRINT
450 IF B$[1,1]="Y" THEN 510
460 IF B$[1,1]="N" THEN 520
470 PRINT
480 PRINT "REMEBER YES OR NO!"
490 PRINT
500 GOTO 430
510 GOSUB 680
520 LET L3=L1+L2-T2
530 PRINT "THE LENGTH OF THE RAFTER WILL BE ";L3;" INCHES."
540 PRINT
550 PRINT "THE RAFTER WILL BE ";L3/12;" FEET IN LENGTH."
560 PRINT
570 PRINT "ARE THERE ANY MORE RAFTERS TO BE COMPUTED? YES OR
    NO"
580 PRINT
590 INPUT C$
600 IF C$[1,1]="Y" THEN 140
610 STOP
620 PRINT "GIVE THE OVERHANG DIMENSION IN DECIMAL PARTS OF A
    FOOT."
630 PRINT
640 INPUT O
650 PRINT
660 LET L2=O*SQR(H)
670 RETURN
```

```
680 PRINT "GIVE THE THICKNESS OF THE RIDGEBOARD IN DECIMAL PARTS
        OF AN INCH."
690 PRINT
700 INPUT T
710 PRINT
720 LET T2=T/2
730 RETURN
740 END
```

SERVICE AND CIRCUIT REQUIREMENTS FOR A RESIDENTIAL HOME

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: Dale Amunson
Clarksville Community School
Clarksville, Iowa

APPLICATIONS: Construction

INTRODUCTION: This program is intended to be used by the student studying residential wiring. It is an informative program in that circuit requirements, fusing requirements and wattage consumption values are given. It will do the mathematics necessary to give the number of circuits and the service entrance requirements for a home. It can also be used as an instructional reinforcement tool if the student has to figure the requirements before using the computer.

Before using the computer, it will be necessary for the student to have studied the floor plan. From the plan, the dimensions of the various areas of the house must be obtained. It is also necessary to know what appliances, heating and cooling systems, and electric heaters if any are being used. The kitchen plan has to be researched to know the total number of circuits that will be used.

The values used in the program have been taken from the National Electric Code. There are cases where the values might not conform to local codes. It is to the discretion of the user to change these values to fit the local situation.

Reference: Gebert, Kenneth L. **NATIONAL ELECTRICAL CODE BLUEPRINT READING.** Chicago: American Technical Society, 1977.

THE PROGRAM:

```
 1 REM :THIS IS A PROGRAM TO COMPUTE SQ.FT, WATTAGE USE, NUM
       BER OF CIRCUITS, AND SERVICE ENTRANCE REQUIREMENTS
       FOR A HOME.
 2 DIM A(15),L(15),W(15)
 3 S = W1 = C = 0
 4 X = 1
40 PRINT "THIS PROGRAM WILL DETERMINE FOR YOU THE QUALIFICA
       TIONS FOR THE ELECTRICAL REQUIREMENTS OF A HOME."
50 PRINT
60 PRINT "YOU MUST HAVE PREVIOUSLY DETERMINED THE APPLIANCE
       AND HEATING SYSTEMS (FROM THE CONTRACTOR) THAT THIS
       HOUSE WILL CONTAIN."
70 PRINT
80 PRINT "YOU MUST HAVE ALSO DETERMINED THE DIMENSIONS OF
       THE VARIOUS AREAS OF THE HOUSE."
```

```
 90 PRINT
100 PRINT "IF THE HOUSE IS A 2 STORY 24' X 24' THE 2 STORIES SHOULD
        BE LISTED SEPARATELY."
110 PRINT
120 PRINT "THE AREA MUST FIRST BE COMPUTED.  GIVE THE DIMEN
        SIONS OF THE AREAS OF THE HOUSE - IGNORE THE BASEMENT
        UNLESS FINISHED AND THE GARAGE."
130 PRINT
140 PRINT "GIVE THE DIMENSIONS USING THE EXAMPLE 24' X 24'=24,24."
150 PRINT
160 INPUT L(X),W(X)
170 A(X)=L(X)*W(X)
175 S = S + A(X)
180 PRINT
220 PRINT "ARE THERE MORE DIMENSIONS? (YES OR NO)"
240 INPUT D$
260 PRINT
280 IF LEFT$ (D$,1) = "Y" THEN GOTO 380
300 IF LEFT$ (D$,1) = "N" THEN GOTO 440
320 PRINT "BAD INPUT! YES OR NO, PLEASE!"
340 GOTO 220
380 X = X + 1
400 GOTO 140
440 PRINT
460 PRINT "THE DIMENSIONS AND AREAS ARE LISTED BELOW."
480 PRINT
500 PRINT TAB( 5)"AREA","LENGTH","WIDTH"
505 GOSUB 10000
600 FOR I = 1 TO X
620 PRINT TAB( 5)A(I),L(I),W(I)
640 NEXT I
660 PRINT
680 PRINT "THE SUM OF THE AREAS IS: "S
685 PRINT
690 PRINT "PRESS RETURN TO CONTINUE"G$
692 INPUT G$
700 REM : COMPUTING THE WATTAGE
720 PRINT "NEXT THE NUMBER OF APPLIANCES AND WATTAGES DRAWS
        MUST BE DETERMINED."
730 PRINT
740 PRINT "YOU WILL BE GIVEN A LIST OF APPLIANCES AND YOU MUST
        CHOSE THOSE THAT ARE BEING USED."
760 W1 = W1 + S1
780 C = C + B1
781 PRINT
782 PRINT "PRESS RETURN TO CONTINUE"G$
783 INPUT G$
784 PRINT
800 HOME
820 PRINT "FROM THE LIST, CHOSE THE NUMBERS CORRESPONDING TO
        APPLIANCES IN THE HOUSE."
```

```
840 PRINT "1. DISHWASHER"
850 PRINT "2. ELECTRIC RANGE"
860 PRINT "3. ELECTRIC DRYER"
870 PRINT "4. WATER HEATER"
880 PRINT "5. WATER PUMP"
890 PRINT "6. AIR CONDITIONER"
900 PRINT "7. ELECTRIC HEATERS"
910 PRINT "8. MISCELLANEOUS"
915 PRINT "9. APPLIANCE CIRCUITS"
920 PRINT "10. GAS FURNACE"
930 PRINT "11. CALCULATE CIRCUITS & WATTAGES"
950 INPUT A
980 ON A GOTO 1000,1040,2080,3020,3070,4020,5070,6000,6060,7011,7020
1000 REM :DISHWASHER
1010 PRINT "THERE MUST BE AT LEAST 1, 20 AMP CIRCUIT ALLOWED FOR
     THE DISHWASHER.  1500 WATTS ARE CONSUMED."
1020 S1 = 1500
1025 B1 = 1
1030 GOTO 760
1040 REM : ELECTRIC RANGE
1050 PRINT "THERE MUST BE 2, 50 AMP CIRCUITS FOR EACH RANGE. EACH
     RANGE IS 15000 WATTS."
1060 PRINT "IS THERE MORE THAN ONE ELECTRIC RANGE?  YES OR NO."
1070 INPUT D$
1080 IF LEFT$ (D$,1) = "N" THEN 2050
1090 IF LEFT$ (D$,1) = "Y" THEN 2000
2000 PRINT "HOW MANY ARE THERE?"
2010 INPUT M
2020 S1 = 15000 * M
2030 B1 = 2 * M
2040 GOTO 760
2050 S1 = 15000
2055 C1 = 2
2060 GOTO 760
2070 REM :ELECTRIC DRYER
2080 PRINT "THE ELECTRIC DRYER CONSUMES 5000 WATTS. 2, 30 AMP
     CIRCUITS MUST BE USED."
2090 S1 = 5000
3000 C1 = 2
3010 GOTO 760
3020 REM :WATER HEATER
3030 PRINT "THE ELECTRIC WATER HEATER USES 7500 WATTS. 2, 30 AMP
     CIRCUITS MUST BE USED."
3040 S1 = 7500
3050 C1 = 2
3060 GOTO 760
3070 REM :WATER PUMP
3080 PRINT "THE WATER PUMP USES 1250 WATTS. 2, 15 AMP CIRCUITS
     MUST BE USED."
3090 S1 = 1250
4000 C1 = 2
4010 GOTO 760
```

```
4020 REM :AIR CONDITIONER
4030 PRINT "THE AIR CONDITIONER WATTAGE VALUE IS DEPENDENT
     UPON THE UNIT AND THE INSTALLATION. CENTRAL AIR OR
     WINDOW AIR. THE WATTAGE VALUE MUST BE OBTAINED
     FROM THE AIR CONDITIONER."
4040 PRINT
4060 PRINT "GENERALLY 12500 WATTS IS AN AVERAGE VALUE FOR CEN
     TRAL AIR. ALLOW FOR 2, 40 AMP CIRCUITS."
4080 S3 = 12500
5000 B1 = 2
5010 GOTO 760
5020 REM :ELECTRIC HEAT
5030 PRINT "FOR ELECTRIC HEAT LARGER THAN 110 VOLTS THE WATTAGE
     VALUE WILL HAVE TO BE GIVEN TO THE COMPUTER. THE NUM
     BER OF CIRCUITS MUST BE GIVEN ALSO. GIVE THESE VALUES
     WATTAGE FIRST."
5035 PRINT
5037 PRINT "IN THE CASE OF BATHROOM EXHAUST-FAN HEATERS, ALLOW
     1, 500 WATTS AND 1 CIRCUIT FOR EACH UNIT."
5050 INPUT S1
5070 INPUT B1
5090 GOTO 760
6000 PRINT "GIVE ANY MISCELLANEOUS WATTAGE VALUES OVER 1000
     WATTS. TOTAL WATTAGE ONLY, THEN GIVE THE APPROXI
     MATE NUMBER OF CIRCUITS."
6030 INPUT S1
6040 INPUT B1
6050 GOTO 760
6060 REM : APPLIANCE CIRCUITS
6070 PRINT "FROM THE NEC THERE MUST BE AT LEAST 2, 20 AMP 1500
     WATT KITCHEN CIRCUITS AT 1150V + 1, 20 AMP 1500 WATT
     LAUNDRY CIRCUIT + 1, 20 AMP 1500 WATT GFI CIRCUIT."
6075 PRINT
6076 PRINT "HOW MANY ADDITIONAL APPLIANCE CIRCUITS WILL THERE
     BE?"
6077 PRINT
7000 INPUT BA
7005 B1 = BA + 4
7006 S1 = (BA *1500) + 6000
7010 GOTO 760
7011 REM :GAS FURNACE
7012 PRINT "IT IS NOT NECESSARY TO WORRY ABOUT THE WATTAGE OF A
     GAS FURNACE ONLY THAT ONE CIRCUIT HAS TO BE ALLOTTED
     FOR IT."
7013 B1 = 1
7014 GOTO 760
7020 REM : CALCULATION
7030 S2 = S * 3
7035 C1 = S2 / 115
7040 C2 = C1 / 15
```

```
7041 IF C2 > INT (C2) THEN 7042
7042 C2 = INT (C2) + 1
7045 C = C + C2
7050 W1 = W1 + S2
7060 W2 = W1 - 10000
7070 W3 = W2 * .4
7080 W4 = 10000 + W3 + S3
8000 AS = W4 / 230
8010 Z = ( INT (AS * 100 + .5) / 100)
8020 PRINT "THE TOTAL NUMBER OF WATTS CONSUMED USING THE NEC
          IS "W4
8040 PRINT
8050 PRINT "THE TOTAL NUMBER OF CIRCUITS IS: "C
8060 PRINT
8070 PRINT "THE TOTAL AMPERAGE DRAW WILL BE: "Z
8080 PRINT
8090 PRINT "ANOTHER CALCULATION REUSING YOUR FIGURES WILL HELP
          VALIDIFY THESE FIGURES."
9000 PRINT
9010 PRINT TAB( 18)"ZAP"
9999 END
10000 PRINT "-----------------------------------------------------------------------------"
10010 RETURN
```

ENERGY AND POWER

BASIC ELECTRICITY TEST

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: Rex Engelkemier
Valley High School
West Des Moines, Iowa

APPLICATION: Energy and Power

INTRODUCTION: This program is designed to assess the student's basic knowledge in electricity before and after they complete a beginning course in electricity. This program could also be used as a graded quarter or semester test. The percentage of right responses is indicated at the end of the test.

It covers such content as: Electricity, both the source of and theory, and Circuits, series and parallel.

In two schools where this program was used, the average student response was about 40% when used as a pretest.

THE PROGRAM:

```
 0 REM ELECTRICITY PRE/POST TEST.
 5 PRINT : PRINT : PRINT : PRINT : PRINT TAB( 6)"A BASIC ELECTRICITY
       TEST OF"
 6 PRINT TAB( 9)"TWENTY-FIVE QUESTIONS"
10 PRINT : PRINT: PRINT TAB( 6)"ENTER THE NUMBER IN FRONT OF THE
       ANSWER OF YOUR CHOICE."
20 PRINT : PRINT : PRINT : PRINT : PRINT "ELECTRICITY CAN BE DEFINED
       AS MOVING-"
30 PRINT : PRINT TAB( 10)1". PROTONS"
40 PRINT : PRINT TAB( 10)2". ELECTRONS"
50 PRINT : PRINT TAB( 10)3". NEUTRONS"
60 INPUT X
70 IF X=2 THEN 110
80 LET A=1
90 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
100 GOTO 30
110 PRINT : PRINT: PRINT "WHEN ELECTRICITY FLOWS FREELY IN A
       MATERIAL, IT IS CALLED A-"
120 PRINT : PRINT TAB( 10)1". CONDUCTOR"
130 PRINT : PRINT TAB( 10)2". INSULATOR"
140 PRINT : PRINT TAB( 10)3". SEMI-CONDUCTOR"
150 INPUT X
160 IF X=1 THEN 210
170 LET B=1
180 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
190 GOTO 120
210 PRINT : PRINT : PRINT "WHAT IS THE BASIC UNIT OF RESISTANCE?"
```


45

```
220 PRINT : PRINT TAB( 10)1". WATT"
230 PRINT : PRINT TAB( 10)2". VOLT"
240 PRINT : PRINT TAB( 10)3". OHM"
250 PRINT : PRINT TAB( 10)4". AMP"
260 INPUT X
270 IF X=3 THEN310
280 LET C=1
290 PRINT : PRINT : "WRONG ANSWER-TRY AGAIN"
300 GOTO 220
310 PRINT : PRINT: PRINT "WHAT IS THE BASIC UNIT OF CURRENT?"
320 PRINT : PRINT TAB( 10)1". WATT"
330 PRINT : PRINT TAB( 10)2". VOLT"
340 PRINT : PRINT TAB( 10)3". OHM"
350 PRINT : PRINT TAB( 10)4". AMP"
360 INPUT X
370 IF X=4 THEN 410
380 LET D=1
390 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
400 GOTO 320
410 PRINT : PRINT : PRINT "WHAT IS THE RESISTANCE OF A RED, BLUE,
        AND ORANGE RESISTOR?"
420 PRINT : PRINT : PRINT 1". 2600",2". 3600",3". 26000"
430 INPUT X
440 IF X=3 THEN 510
450 LET E=1
460 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
470 GOTO 420
510 PRINT : PRINT : PRINT "WHAT IS THE RESISTANCE OF A RED,
        YELLOW, AND GOLD RESISTOR?"
520 PRINT : PRINT : PRINT 1". 7400",2". 2.4",3". 24000"
530 INPUT X
540 IF X=2 THEN 610
550 LET F=1
560 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
570 GOTO 520
610 PRINT : PRINT : PRINT "WHAT IS THE TOLERANCE OF A RESISTOR
        WITH A SILVER FOURTH BAND?"
620 PRINT : PRINT : PRINT 1". 5%",2". 10%,3". 20%
630 INPUT X
640 IF X=2 THEN 710
650 LET G=1
660 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
670 GOTO 620
710 PRINT : PRINT : PRINT "ELECTRICAL ENERGY IS NOT PRODUCED BY-"
720 PRINT : PRINT TAB( 10)1". FRICTION"
730 PRINT : PRINT TAB( 10)2". HEAT"
740 PRINT : PRINT TAB( 10)3". PRESSURE"
750 PRINT : PRINT TAB( 10)4". ROTATION"
760 INPUT X
770 IF X=4 THEN 810
780 LET H=1
790 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
```

```
800 GOTO 720
810 PRINT : PRINT "TO GENERATE ELECTRICITY IN A CRYSTAL ---
          MUST BE APPLIED."
820 PRINT : PRINT TAB( 10)1". FRICTION"
830 PRINT : PRINT TAB( 10)2". HEAT"
840 PRINT : PRINT TAB( 10)3". PRESSURE"
850 PRINT : PRINT TAB( 10)4". ROTATION"
860 INPUT X
870 IF X=3 THEN 910
880 LET I=1
890 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
900 GOTO 820
910 PRINT : PRINT : PRINT "THE LIQUID PART OF A BATTERY IS CALLED
          THE-"
920 PRINT : PRINT TAB( 10)1". ELECTROLYTE"
930 PRINT : PRINT TAB( 10)2". JUICE"
940 PRINT : PRINT TAB( 10)3". LIQUID"
950 INPUT X
960 IF X=1 THEN 1010
970 LET J=1
980 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
990 GOTO 920
1010 PRINT : PRINT : PRINT "A CELL IN A BATTERY MUST BE COMPOSED
          OF TWO DIFFERENT-"
1020 PRINT : PRINT TAB( 10)1". PLASTICS"
1030 PRINT : PRINT TAB( 10)2". CHEMICALS"
1040 PRINT : PRINT TAB( 10)3". METALS"
1050 INPUT X
1060 IF X=3 THEN 1110
1070 LET K=1
1080 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1090 GOTO 1020
1110 PRINT : PRINT : PRINT "IF THE RESISTANCE OF A CIRCUIT IS ZERO,
          THE CIRCUIT IS-"
1120 PRINT : PRINT TAB( 10)1". OPEN"
1130 PRINT : PRINT TAB( 10)2". CLOSED"
1140 PRINT : PRINT TAB( 10)3". SHORTED"
1150 INPUT X
1160 IF X=3 THEN 1210
1170 LET L=1
1180 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1190 GOTO 1120
1210 PRINT : PRINT : PRINT "MOST OF THE ELECTRICAL POWER USED IN
          OUR HOMES IS PRODUCED BY-"
1220 PRINT : PRINT TAB( 10)1". CHEMICAL REACTION"
1230 PRINT : PRINT TAB( 10)2". DC GENERATORS"
1240 PRINT : PRINT TAB( 10)3". SOLAR ENERGY"
1250 PRINT : PRINT TAB( 10)4". AC GENERATORS"
1260 INPUT X
1270 IF X=4 THEN 1310
1280 LET M=1
1290 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
```

```
1300 GOTO 1220
1310 PRINT : PRINT : PRINT "A STORAGE BATTERY PRODUCES-"
1320 PRINT : PRINT : PRINT 1". DC",2". AC",3   ". AC-DC"
1330 INPUT X
1340 IF X=1 THEN 1410
1350 LET N=1
1360 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1370 GOTO 1320
1410 PRINT : PRINT : PRINT "A CARBON-ZINC DRY CELL HAS-"
1420 PRINT : PRINT TAB( 10)1". TWO VOLTS"
1430 PRINT : PRINT TAB( 10)2". SIX VOLTS"
1440 PRINT : PRINT TAB( 10)3". ONE AND ONE-HALF VOLTS"
1450 PRINT : PRINT TAB( 10)4". TWELVE VOLTS"
1460 INPUT X
1470 IF X=3 THEN 1510
1480 LET O=1
1490 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1500 GOTO 1420
1510 PRINT : PRINT : PRINT "A LEAD-ACID WET CELL HAS-"
1520 PRINT : PRINT TAB( 10)1". TWO VOLTS"
1530 PRINT : PRINT TAB( 10)2". SIX VOLTS"
1540 PRINT : PRINT TAB( 10)3". ONE AND ONE-HALF VOLTS"
1550 PRINT : PRINT TAB( 10)4". TWELVE VOLTS"
1560 INPUT X
1570 IF X=1 THEN 1610
1580 LET P=1
1590 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1600 GOTO 1520
1610 PRINT : PRINT : PRINT "THE MOST COMMON RECHARGABLE DRY
          CELL IS THE-"
1620 PRINT : PRINT TAB( 10)1". ALKALINE"
1630 PRINT : PRINT TAB( 10)2". MERCURY"
1640 PRINT : PRINT TAB( 10)3". NICKEL-CADMIUM"
1650 PRINT : PRINT TAB( 10)4". SILVER-ZINC"
1660 INPUT X
1670 IF X=3 THEN 1710
1680 LET Q=1
1690 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1700 GOTO 1620
1710 PRINT : PRINT : PRINT "CELLS CONNECTED IN SERIES INCREASE THE-"
1720 PRINT : PRINT TAB( 10)1". VOLTAGE"
1730 PRINT : PRINT TAB( 10)2". AMPERAGE"
1740 PRINT : PRINT TAB( 10)3". RESISTANCE"
1750 INPUT X
1760 IF X=1 THEN 1810
1770 LET R=1
1780 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1790 GOTO 1720
1810 PRINT : PRINT : PRINT "CELLS CONNECTED IN PARALLEL INCREASE
          THE-"
1820 PRINT : PRINT TAB( 10)1". VOLTAGE"
1830 PRINT : PRINT TAB( 10)2". AMPERAGE"
```

```
1840 PRINT : PRINT TAB( 10)3". RESISTANCE"
1850 INPUT X
1860 IF X=2 THEN 1910
1870 LET S=1
1880 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1890 GOTO 1820
1910 PRINT : PRINT : PRINT "VOLTAGE DROPS OF A SERIES CIRCUIT ARE
          ---THE SOURCE VOLTAGE."
1920 PRINT : PRINT TAB( 10)1". GREATER THAN"
1930 PRINT : PRINT TAB( 10)2". EQUAL TO"
1940 PRINT : PRINT TAB( 10)3". LESS THAN"
1950 INPUT X
1960 IF X=2 THEN 2010
1970 LET T=1
1980 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1990 GOTO 1920
2010 PRINT : PRINT : PRINT "IN A SERIES CIRCUIT THE --- STAYS THE SAME
          THROUGH THE LOADS."
2020 PRINT : PRINT : PRINT 1". CURRENT",2". VOLTAGE"
2030 INPUT X
2040 LET U=1
2060 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
2070 GOTO 2020
2110 PRINT : PRINT : PRINT "IN A PARALLEL CIRCUIT THE --- STAYS THE
          SAME ACROSS THE LOADS."
2120 PRINT : PRINT PRINT 1". CURRENT",2". VOLTAGE"
2130 INPUT X
2140 IF X=2 THEN 2210
2150 LET V=1
2160 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
2170 GOTO 2120
2210 PRINT : PRINT : PRINT "A FUSE IS CONNECTED IN --- WITH THE LOAD."
2220 PRINT : PRINT : PRINT 1". SERIES",2". PARALLEL"
2230 INPUT X
2240 IF X=1, THEN 2310
2250 LET W=1
2260 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
2270 GOTO 2220
2310 PRINT : PRINT : PRINT "AN AMMETER IS CONNECTED IN --- TO THE
          LOAD."
2320 PRINT : PRINT : PRINT 1". SERIES",2". PARALLEL"
2330 INPUT X
2340 IF X=1 THEN 2410
2350 LET Y=1
2360 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
2370 GOTO 2320
2410 PRINT : PRINT : PRINT "A VOLTMETER IS CONNECTED IN --- TO THE
          LOAD."
2420 PRINT : PRINT : PRINT 1". SERIES",2". PARALLEL"
2430 INPUT X
2440 IF X=2 THEN 2480
2450 LET Z=1
```

```
2460 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
2470 GOTO 2420
2480 LET  X=A+B+C+D+E+F+G+H+I+J+K+L+M+N+O+P+Q+R+S
          +T+U+V+W+Y+Z
2490 LET X=100-4*X
2500 PRINT : PRINT : PRINT : PRINT : PRINT "PERCENTAGE OF RIGHT RE-
          SPONSES IS ";X;"%"
2510 IF X=100 THEN : PRINT : PRINT "WOULD YOU LIKE TO TEACH THIS
          ELECTRONICS CLASS?"
2520 END
```

BUILDING HEAT LOSS

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: Rex Engelkemier
Valley High School
West Des Moines, Iowa

APPLICATIONS: Energy and Power

INTRODUCTION: This program will calculate the total heat loss of a wood frame or concrete block building. Different options of fiberglass batt, foam, or no insulation can be used. Also brick veneer is calculated. Both 2x4 and 2x6 wood frame walls are considered.

A worksheet should be used to require each student to find the information needed to run this program. The information could be taken from their parent's house, garage, or any structure that is wood frame or concrete block. The worksheet should include the following information:

1. The size of each outside wall. Walls must be divided up according to flat surface area. Simple houses may have four walls while more complex shaped houses will have more than four. The student should measure each outside surface and record them on a worksheet. Remember to record measurements in units of feet - not feet and inches. For example: 24ft. 6 in. = 24.5ft. Do not subtract the window or door area from the wall as the computer will do this. Just record the length and height of each wall.
2. The type of wall. The following combinations are included in this program but more could be added:
   a. 2x4 wood frame-no insulation
   b. 2x4 wood frame-fiberglass insulation
   c. 2x4 wood frame-fiberglass and foam insulation
   d. 2x4 wood frame-fiberglass insulation and brick veneer
   e. 2x6 wood frame-fiberglass insulation
   f. Concrete block and brick veneer
   g. Concrete block and foam insulation
3. Record the number of windows in each wall. Record their size in units of feet and whether they are single, double or triple pane.
4. If a door is in a wall, record the size and whether it is wood or metal-insulated.
5. Record ceiling size, type of insulation if any, and the thickness of the insulation. Note: The ceiling insulation thickness is measured in **inches**. If the ceiling is shaped other than a rectangle, convert it to one length and width measurement.

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6. The design degree difference is the temperature you must enter at the end of this program to find the BTU heat loss. For example: The house is 70°F. inside and the outside temperature is 15°F. The temperature difference is 55°F. Heat loss is measured in BTU's per hour.

THE PROGRAM:

```
 10 PRINT : PRINT : PRINT TAB(11)"(((((((((("
 20 PRINT TAB(11")))))))))"
 30 PRINT TAB(11)"BUILDING HEAT LOSS"
 40 PRINT TAB(11)"(((((((((("
 50 PRINT TAB(11)"BY REX ENGELKEMIER"
 60 PRINT TAB(11")))))))))"
 70 PRINT : PRINT : PRINT "THIS PROGRAM WILL CALCULATE THE TOTAL
       HEAT LOSS OF A WOOD FRAME OR CONCRETE BLOCK/BRICK
       BUILDING."
 75 FOR X = 1 TO 7000: NEXT X
 80 PRINT : PRINT : PRINT TAB(9)"* * * PROCEDURE * * *"
 90 PRINT : PRINT "1. DIVIDE THE BUILDING INTO SEPARATE 'OUTSIDE'
       WALLS."
100 PRINT : PRINT "2. ENTER THE NUMBER OF WALLS USED."
110 PRINT : PRINT "3. ENTER WALL #1, IT'S TYPE, AND SIZE."
120 PRINT : PRINT "4. ENTER EACH WINDOW TYPE AND SIZE IN THE ABO
       VE WALL."
130 PRINT : PRINT "5. ENTER DOOR TYPE AND SIZE OF THE ABOVE
       WALL."
140 PRINT : PRINT "6. REPEAT THE ABOVE STEPS 2-5 FOR EACH WALL."
150 PRINT : PRINT "7. ENTER CEILING INSULATION TYPE, THICKNESS,
       AND SIZE."
160 PRINT : PRINT "8. ENTER ALL DIMENSIONS IN 'FEET'."
170 R = 0:S = 0:U = 0:T = 0
180 PRINT : PRINT : PRINT : INPUT "     HOW MANY OUTSIDE WALLS?";N
185 IF N = 0 THEN 575
190 FOR J = 1 TO N
195 PRINT : PRINT : PRINT TAB( 7)" 'TYPE OF WALL'          'U-FACTOR' "
200 PRINT : PRINT "WOOD FRAME (2X4)                              .422"
210 PRINT : PRINT "WOOD FRAME + FIBERGLASS BATT                  .080"
220 PRINT : PRINT "WOOD FRAME + FIBGL. BT. + FOAM                .049"
230 PRINT : PRINT "WOOD FRAME + FIBGL. BT. + BRICK               .078"
240 PRINT : PRINT "CONCRETE BLOCK + BRICK                        .261"
250 PRINT : PRINT "CONCRETE BLOCK + FOAM                         .087"
255 PRINT : PRINT "WOOD FRAME (2x6) + FIBGL. BT.                 .049"
260 PRINT : PRINT : PRINT : PRINT TAB( 8)"WALL NUMBER ";J
270 PRINT : INPUT "U-FACTOR?";WT
300 PRINT : INPUT "LENGTH- ";L
305 PRINT : INPUT "HEIGHT- ";H
310 A = L * H
320 PRINT : PRINT : INPUT "NUMBER OF WINDOWS- ";M
325 IF M = 0 THEN 455
330 FOR I = 1 TO M
340 PRINT : PRINT : PRINT TAB( 8)"WINDOW NUMBER ";I
```


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```
350 PRINT : PRINT " 'TYPE OF WINDOW'                    'U-FACTOR' "
360 PRINT : PRINT TAB(4)"SINGLE PANE                        1.100"
370 PRINT : PRINT TAB(4)DOUBLE PANE                         .499"
380 PRINT : PRINT TAB(4)"TRIPLE PANE                        .310"
390 PRINT : INPUT "U-FACTOR?";GT
420 PRINT : INPUT "WIDTH- ";W
425 PRINT : INPUT "HEIGHT- ";H
430 AW = S * H:HLW = AW * GT
440 R = R + AW:S = S + HLW
450 NEXT I
455 PRINT : PRINT : PRINT " "TYPE OF DOOR'       'U-FACTOR' "
460 PRINT PRINT TAB( 5)"NO DOOR                             0"
470 PRINT : PRINT TAB( 5)"WOOD DOOR                       .493"
480 PRINT : PRINT TAB( 5)"INSULATED DOOR                  .125"
490 PRINT : INPUT "U-FACTOR?";DT
500 IF DT = 0 THEN 550
520 PRINT : INPUT "WIDTH- ";W
530 AD = W * 6.75:HLD = AD * DT
540 U = U + HLD
550 WA = A - R - AD:HLW = WA * WT:R = 0
560 T = T + HLW
570 NEXT J
575 PRINT : PRINT : PRINT : PRINT "TYPE OF CEILING INSULATION 'U-FAC
    TOR' "
580 PRINT : PRINT TAB( 5)"NO INSULATION                   .575"
590 PRINT : PRINT TAB( 5)"FIBERGLASS BATT                 .315"
600 PRINT : PRINT TAB( 5)"BLOWN FIBERGLAS                 .370"
610 PRINT : PRINT TAB( 5)"ROCKWOOL                        .250"
620 PRINT : PRINT TAB( 5)"BLOWN CELLULOSE                 .280"
630 PRINT : INPUT "U-FACTOR?";CT
650 IF CT = .575 THEN 670
660 PRINT : INPUT "THICKNESS IN 'INCHES'- ";TH
665 TH = 1 / TH
670 PRINT : INPUT "LENGTH OF CEILING- ";L
680 PRINT : INPUT "WIDTH OF CEILING- ";W
685 IF TH = 0 THEN TH = 1
690 HLC = L * W * TH * CT
700 PRINT : PRINT : PRINT "HEAT LOSS = THE PRODUCT OF THE AREA,
    THE U-FACTOR, AND THE TEMP. DIFFERENCE."
710 PRINT : INPUT "WHAT IS THE TEMP. DIFF. IF F'?";TD
720 HLT = (S + U + T + HLC) * TD
730 PRINT : PRINT : PRINT : PRINT : PRINT TAB( 8)"TOTAL BUILDING
    HEAT LOSS"
740 PRINT : PRINT TAB( 13)HLT;" BTU'S"
750 END
```


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** CAPACITANCE - RESISTANCE **

COMPUTER: Apple; O.S.I. C2-4P: Informer

LANGUAGE: Microsoft BASIC; Applesoft; Informer BASIC

AUTHOR: John Lyman
Kennedy High School
Cedar Rapids, Iowa

APPLICATION: Energy and Power

INTRODUCTION: A program such as this can be applied to the solving of total resistance and total capacitance in series and parallel circuits. The program will not solve problems which are mixed series - parallel or capacitance - resistance circuits.

The use of the program for quick checks of complex problems and for the student to use with practice drills can give the students more time to work with problems in resistance and capacitance. In addition the instructor will have more time to spend with students in other problem areas.

Some problems are solved which result in very large or very small numbers. These are shown on the computer as "E notation" which is the same as scientific notation.

Example:
Number = .00000628
Scientific notation = 6.28 x 10-6
"E notation" = 6.28E-6

THE PROGRAM:

```
 10 REM RESISTANCE & CAPACITANCE BY JOHN LYMAN
 20 REM  JULY, 1979
 30 REM THIS PROGRAM FIGURES TOTAL RESISTANCE IN SERIES & PARAL
       LEL CIRCUITS.
 40 REM THIS PROGRAM ALSO FINDS TOTAL CAPACITANCE IN SERIES &
       PARALLEL CIRCUITS.
 50 PRINT "    ** RESISTANCE & CAPACITANCE **"
 51 PRINT
 52 PRINT
 55 PRINT " SELECT BY THE NUMBER THE PROGRAM"
 56 PRINT "YOU WISH TO RUN."
 57 PRINT
 60 PRINT "     1. SERIES RESISTANCE"
 61 PRINT "     2. PARALLEL CAPACITANCE"
 62 PRINT "     3. PARALLEL RESISTANCE"
 63 PRINT "     4. SERIES CAPACITANCE"
 64 PRINT "     5. I'M FINISHED"
 65 INPUT P
 70 ON P GOTO 500,600,700,800,900
 71 PRINT : PRINT
```

```
500 PRINT "  THIS PROGRAM FINDS THE TOTAL"
501 PRINT "RESISTANCE IN A SERIES CIRCUIT."
502 PRINT
503 CLEAR
510 PRINT "  FIRST GIVE THE TOTAL NUMBER OF"
511 PRINT "RESISTORS IN THE SERIES CIRCUIT.";: INPUT X: PRINT
520 PRINT "  LIST THE VALUE OF EACH RESISTOR"
521 PRINT "AS IT IS CALLED FOR IN OHMS.": PRINT
530 FOR Z = 1 TO X
550 PRINT "    RESISTOR #"Z"=  ";: INPUT RV: PRINT
560 LET R = R + RV
580 NEXT Z
590 PRINT "  TOTAL SERIES RESISTANCE =    "R: PRINT
591 PRINT " DO YOU WISH TO WORK ANOTHER  ";: INPUT A$: PRINT
592 IF A$ = "Y" THEN 500
593 IF A$ = "YES" THEN 500
594 IF A$ <>   "Y" THEN 50
600 PRINT "  THIS PROGRAM FINDS THE TOTAL"
601 PRINT "CAPACITANCE IN A PARALLEL CIRCUIT."
602 CLEAR
603 PRINT
610 PRINT "  FIRST GIVE THE TOTAL NUMBER OF"
611 PRINT "CAPACITORS IN THE PARALLEL CIRCUIT.";: INPUT C: PRINT
620 PRINT "  LIST THE VALUE OF EACH CAPACITOR"
621 PRINT "AS IT IS CALLED FOR IN FARADS.": PRINT : PRINT
630 FOR X = 1 TO C
650 PRINT "    CAPACITOR #"Z"=  ";: INPUT V2: PRINT
660 LET V = V + V2
680 NEXT Z
690 PRINT "  TOTAL CAPACITANCE =  "V: PRINT : PRINT
691 PRINT " DO YOU WISH TO WORK ANOTHER  ";: INPUT C$: PRINT
692 IF C$ = "Y" THEN 600
693 IF C$ = "YES" THEN 600
694 IF C$ <  > "Y" THEN 50
700 PRINT "  THIS PROGRAM FINDS THE TOTAL "
705 PRINT " RESISTANCE IN A PARALLEL CIRCUIT.": PRINT
706 CLEAR
715 PRINT " FIRST GIVE THE TOTAL NUMBER OF "
720 PRINT "RESISTORS IN THE PARALLEL CIRCUIT";: INPUT Y: PRINT
725 PRINT "  LIST THE VALUE OF EACH RESISTOR"
726 PRINT "AS IT IS CALLED FOR IN OHMS.": PRINT
740 PRINT "    RESISTOR #"Z"=  ";: INPUT RV: PRINT
770 LET RP = 1 / RV
780 LET RJ = RP + RJ
790 NEXT Z
791 LET R = 1 / RJ: PRINT
795 PRINT "  TOTAL PARALLEL RESISTANCE =  "R: PRINT
796 PRINT " DO YOU WISH TO WORK ANOTHER  ";: INPUT B$: PRINT
797 IF B$ = "Y" THEN 700
798 IF B$ = "YES" THEN 700
799 IF B$ <>  "Y" THEN 50
800 PRINT "  THIS PROGRAM FINDS THE TOTAL "
```


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```
805 PRINT " CAPACITANCE IN A SERIES CIRCUIT.": PRINT
806 CLEAR
815 PRINT "  FIRST GIVE THE TOTAL NUMBER OF "
820 PRINT "CAPACITORS IN A SERIES CIRCUIT.": INPUT M: PRINT
821 PRINT "  LIST THE VALUE OF EACH CAPACITOR"
822 PRINT "AS IT IS CALLED FOR IN FARADS.": PRINT
825 PRINT
830 FOR Z = 1 TO M
840 PRINT "    CAPACITOR #"Z"=  ";: INPUT CV: PRINT
850 LET CP = 1 / CV
860 LET CJ = CP + CJ
880 NEXT Z
890 LET C = 1 / CJ:  PRINT
891 PRINT "  TOTAL SERIES CAPACITANCE =  "C:  PRINT
892 PRINT " DO YOU WISH TO WORK ANOTHER  ";: INPUT D$:  PRINT
893 IF D$ = "Y" THEN 800
894 IF D$ = "YES" THEN 800
895 IF D$  <>"Y" THEN 50
900 PRINT
910 PRINT "  I HOPE THIS PROGRAM HAS HELPED YOU."
920 PRINT "IF YOU HAVE QUESTIONS, CONTACT YOUR"
925 PRINT "INSTRUCTOR.  GOOD LUCK!"
930 END
```

CAPACITIVE REACTANCE

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Marvin Berg
Fort Dodge Senior High School
Fort Dodge, Iowa

APPLICATION: Energy and Power

INTRODUCTION: The capacitive reactance program may be used in a study of AC circuits in electronics. This program will provide the values of capacitive reactance, impedance, current and phase relationship of RC circuits. The usual application of this program is problem-solving.

The values of capacitance, resistance, frequency and voltage must be provided for each circuit. The student should have these in the form of a diagram before using the program. It is necessary to be familiar with E notation which is similar to scientific notation when using this routine. This program involves a single concept of the RC circuit.

THE PROGRAM:

```
 10 PRINT TAB(10);"THIS IS A PROGRAM TO DETERMINE THE CAPACITIVE
      REACTANCE(X)"
 20 PRINT TAB(5)"AND IMPEDANCE(Z) OF AN RC CIRCUIT. YOU WILL ALSO
      RECEIVE THE"
 30 PRINT TAB(5)"CURRENT(I) AND THE COSINE(COS). DO NOT ENTER
      NUMBERS USING"
 40 PRINT TAB(5)"A PREFIX. E NOTATION MAY BE USED WHERE APPRO-
      PRIATE."
 50 PRINT LIN(1)
 60 PRINT TAB(8);"WHAT IS THE VALUE OF THE RESISTANCE?";
 70 INPUT R
 80 PRINT TAB(8);"WHAT IS THE VALUE OF THE CAPACITANCE?";
 90 INPUT C
100 PRINT TAB(8);"WHAT IS THE VALUE OF THE FREQUENCY?";
110 INPUT F
120 PRINT TAB(8);"WHAT IS THE VOLTAGE APPLIED TO THE CIRCUIT?";
130 INPUT E
140 LET X=1/(2*3.1416*F*C)
150 LET Z=SQR(R**2+X**2)
160 LET I=E/Z
170 LET C=R/Z
180 PRINT LIN(1)
190 PRINT TAB(25)"X= ";X
200 PRINT LIN(1)
210 PRINT TAB(25)"Z= ";Z
220 PRINT LIN(1)
230 PRINT TAB(25)"I= ";I
```


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```
240 PRINT LIN(1)
250 PRINT TAB(25)"COS= ";C
260 PRINT LIN(1)
270 PRINT TAB(5)"DO YOU WANT TO CONTINUE WITH ANOTHER CIR
      CUIT?";
280 DIM N$(3)
290 INPUT N$
300 IF N$="YES" THEN 50
310 IF N$="NO" THEN 340
320 PRINT TAB(10)"YOU MUST RESPOND WITH EITHER YES OR NO."
330 GOTO 270
340 END
```

CYLINDER DISPLACEMENT

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Scott Figg
J. B. Young Junior High
Davenport, Iowa

APPLICATION: Energy and Power

INTRODUCTION: This program helps the student in figuring cylinder displacement and should be used in conjunction with a learning unit. The student must enter bore and stroke (in either English of Metric units) and give his/her answer. The computer will then tell the student whether he/she was right or wrong giving them the right answer, if wrong. The student should have some background with cylinder displacement, bore and stroke before attempting this program. The formula used in this program is shown below and should be given to the student.

Cylinder Displacement = [(Bore x Bore)/4] x Pi x Stroke
Pi = 3.14

THE PROGRAM:

```
 10 REM ***NAME STRING
 20 DIM N$[20]
 30 REM *INCHES-CENTIMETRES STRING
 40 DIM B$[15]
 50 REM *YES-NO STRING
 60 DIM A$[10]
 70 REM *ENGLISH-METRIC STRING
 80 DIM C$[10]
 90 PRINT "HELLO, WHAT IS YOUR NAME";
100 INPUT N$
110 PRINT LIN(2)
120 PRINT "HI ";N$
130 PRINT "THIS IS A PROGRAM TO HELP YOU FIGURE THE CYLINDER
      DISPLACEMENT"
140 PRINT "OF A GASOLINE OR DIESEL ENGINE.  THE ENGINE MAY BE A
      SMALL ONE,"
150 PRINT "LIKE THE ONE IN A MOPED, OR IT MAY BE A LARGER ONE,
      AS IN A"
160 PRINT "RACE CAR.  THE EQUATION WE WILL USE IS:"
170 PRINT
180 PRINT "CYLINDER DISPLACEMENT = (BORE**2)/4 X PI X STROKE"
190 PRINT "PLEASE NOTE *** PI=3.14"
200 PRINT LIN(2)
210 PRINT "YOU WILL BE ASKED TO HELP FIGURE THE ANSWERS ";N$;
      ", SO GET"
220 PRINT "YOUR PENCIL AND PAPER."
230 PRINT
```


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```
240 PRINT "OK ";N$;", LET'S BEGIN"
250 PRINT LIN(2)
260 PRINT "DO YOU WANT TO:"
270 PRINT TAB(16);"1 ** USE ENGLISH UNITS?"
280 PRINT TAB(16);"2 ** USE METRIC UNITS?"
290 PRINT TAB(16);"3 ** STOP?"
300 PRINT TAB(16)"(CHOOSE 1,2,OR 3)"
310 INPUT X
320 PRINT LIN(4)
330 GOTO X OF 590,630,750
340 PRINT "YOUR ANSWER MUST BE 1, 2, OR 3."
350 GOTO 260
360 REM ***COMPUTATION SUBROUTINE
370 PRINT "YOU HAVE DECIDED TO USE ";C$;" UNITS.  PLEASE ENTER
        BORE AND"
380 PRINT "STROKE IN ";B$;"."
390 PRINT
400 PRINT "WHAT IS THE BORE";
410 INPUT A
420 PRINT "WHAT IS THE STROKE";
430 INPUT B
440 PRINT
450 PRINT "OK ";N$;", NOW I WANT YOU TO GIVE ME YOUR ANSWER
        USING THE"
460 PRINT "BORE OF ";A;" ";B$;", THE STROKE OF ";B;" ";B$;", AND
        THE"
470 PRINT "FORMULA I GAVE YOU."
480 INPUT C
490 PRINT
500 LET D=(A**2)/4*3.14*B
510 IF C<D+.01 AND C>D-.01 THEN 560
520 IF C<=D+.1 AND C>=D-.1 THEN 570
530 PRINT "CUBIC ";B$;"."
540 PRINT "PLEASE RE-CHECK YOUR FIGURES ";N$;"."
550 GOTO 680
560 PRINT "ALL-RIGHT ";N$;" GOOD JOB!"
570 PRINT "YOU GOT THE RIGHT ANSWER."
580 GOTO 680
590 REM *** ENGLISH SUBROUTINE
600 LET B$="INCHES"
610 LET C$="ENGLISH"
620 GOTO 360
630 REM ***METRIC SUBROUTINE
640 LET B$="CENTIMETRES"
650 LET C$="METRIC"
660 GOTO 360
670 REM ** QUESTION-ANOTHER PROBLEM
680 PRINT LIN(2)
690 PRINT "DO YOU WANT TO TRY ANOTHER PROBLEM ";N$;
```

```
700 INPUT A$
710 IF A$="YES" THEN 250
720 IF A$="NO" THEN 750
730 PRINT "YOU MUST ANSWER YES OR NO."
740 GOTO 680
750 END
```


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ENERGY AND POWER PRE-TEST

COMPUTER: Apple II

LANGUAGE: William James
Williamsburg Community School
Williamsburg, Iowa

APPLICATIONS: Energy and Power

INTRODUCTION: This Energy and Power (engines) drill will be directed towards the entry level student's prior knowledge of the historical contribution, present practices and future potentials of industry and technology.

THE PROGRAM:

```
  5 PRINT "THIS PROGRAM WILL INTRODUCE YOU TO THE WORLD OF
    -ENERGY & POWER- IN THE FORM OF A BRIEF HISTORY OF
    ENGINES."
  6 PRINT : PRINT : PRINT
 10 PRINT TAB( 5)"ENTER THE NUMBER IN FRONT OF THE ANSWER OF
    YOUR CHOICE."
 20 PRINT : PRINT : PRINT "THE FIRST STEAM ENGINE WAS BUILT BY"
 30 PRINT : PRINT TAB( 10)1". THOMAS NEWCOMEN"
 40 PRINT : PRINT TAB( 10)2". JAMES WATT"
 50 PRINT : PRINT TAB( 10)3". CHRISTIAN HUGHENS"
 55 PRINT : PRINT TAB( 10)4". NICOLIAS OTTO"
 60 INPUT X
 70 IF X=1 THEN 105
 80 LET A=1
 90 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
100 GOTO 30
105 PRINT "THAT'S RIGHT-NEXT QUESTION."
110 PRINT : PRINT : PRINT "THE FIRST GASOLINE ENGINE TO BE OPERAT
    ED ON EXPANDING GAS WAS BUILT BY"
120 PRINT : PRINT TAB( 10)1". THOMAS NEWCOMEN"
130 PRINT : PRINT TAB( 10)2". JAMES WATT"
140 PRINT : PRINT TAB( 10)3". CHRISTIAN HUGHENS"
145 PRINT : PRINT TAB( 10)4". NICHOLAS OTTO"
150 INPUT X
160 IF X=3 THEN 200
170 LET B=1
180 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
190 GOTO 120
200 PRINT "GOOD JOB-HERE'S ANOTHER ONE."
210 PRINT : PRINT : PRINT"IN A FOUR STROKE ENGINE THE EXHAUST
    VALVE STARTS TO OPEN DURING THE "
220 PRINT : PRINT TAB( 10)1". COMPRESSION STROKE"
230 PRINT : PRINT TAB( 10)2". POWER STROKE"
240 PRINT : PRINT TAB( 10)3". EXHAUST STROKE"
250 PRINT : PRINT TAB( 10)4". INTAKE STROKE"
```

```
260 INPUT X
270 IF X=3 THEN 305
280 LET C=1
290 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
300 GOTO 220
305 PRINT "YOU ARE REALLY GOOD."
310 PRINT : PRINT : PRINT " A TWO-STROKE CYCLE GASOLINE ENGINE
        CONTAINS"
320 PRINT : PRINT TAB( 10)1". POPPET VALVES"
330 PRINT : PRINT TAB( 10)2". A BLOWER"
340 PRINT : PRINT TAB( 10)3". AN INJECTOR"
350 PRINT : PRINT TAB( 10)4". REED VALVES"
360 INPUT X
370 IF X¼ THEN 405
380 LET D=1
390 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
400 GOTO 320
405 PRINT "LOOKING GOOD-TRY THIS ONE."
410 PRINT : PRINT : PRINT "RUDOLPH DIESEL INVENTED THE "
420 PRINT : PRINT : PRINT "1. INTERNAL-COMBUSTION ENGINE"
430 PRINT : PRINT : PRINT "2. EXTERNAL-COMBUSTION ENGINE"
440 PRINT : PRINT : RPINT "3. COMPRESSION-IGNITION ENGINE"
445 PRINT : PRINT : PRINT "4. SPARK-IGNITION ENGINE"
460 INPUT X
470 IF X=3 THEN 505
480 LET E=1
490 PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
500 GOTO 410
505 PRINT "YOU SURE KNOW A LOT ABOUT ENGINES."
510 PRINT : PRINT : PRINT " A TWO STROKE DIESEL ENGINE CONTAINS"
520 PRINT : PRINT : PRINT "1. A BLOWER"
530 PRINT : PRINT : PRINT "2. REED VALVES"
540 PRINT : PRINT : PRINT"3. A CARBURETOR"
550 PRINT : PRINT : PRINT "4. SPARK PLUGS"
560 PRINT : PRINT : PRINT "5. A STEAM BOILER"
570 INPUT X
580 IF X=2 THEN 645
590 LET F=1
600 PRINT : PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
610 GOTO 520
645 PRINT "CORRECT - TRY THIS QUESTION ON FOR SIZE."
650 PRINT : PRINT : PRINT " THE STIRLING ENGINE IS"
660 PRINT : PRINT : PRINT "1. AN INTERNAL-COMBUSTION ENGINE"
670 PRINT : PRINT : PRINT "2. A RECIPROCATION-TYPE ENGINE"
680 PRINT : PRINT : PRINT "3. A COMPRESSION-IGNITION ENGINE"
690 PRINT : PRINT : PRINT "4. A SPARK-IGNITION ENGINE"
700 INPUT X
710 IF X=2 THEN 825
720 LET G=1
730 PRINT : PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
780 GOTO 650
825 PRINT "EXCELLENT!! THIS NEXT QUESTION IS A LITTLE HARDER."
```


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```
830 PRINT : PRINT : PRINT "THE GAS-TURBINE ENGINE IS"
840 PRINT : PRINT : PRINT "1. A JET ENGINE"
850 PRINT : PRINT : PRINT "2. A DIESEL ENGINE"
860 PRINT : PRINT : PRINT "3. A COMPRESSION-IGNITION ENGINE"
870 PRINT : PRINT : PRINT "4. A RECIPRCATION-TYPE ENGINE"
880 INPUT X
890 IF X=4 THEN 925
900 LET H=1
910 PRINT : PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
920 GOTO 830
925 PRINT "*****RIGHT AGAIN***** SEE IF YOU CAN HANDLE THIS NEXT
    QUESTION."
930 PRINT : PRINT : PRINT "THE AUTOMOTIVE GAS-TURBINE ENGINE"
940 PRINT : PRINT : PRINT "1. DELIVERS MORE POWER PER POUND OF
    WEIGHT THAN A PISTON-TYPE ENGINE."
950 PRINT : PRINT : PRINT "2. IS MORE ECONOMICAL THAN A PISTON-
    TYPE ENGINE."
960 PRINT : PRINT : PRINT "3. IS A COMPRESSION-IGNITION TYPE ENGINE
    "
970 PRINT : PRINT : PRINT "4. OPERATES MORE EFFICIENTLY IN TRAF
    FIC."
980 INPUT X
990 IF X=1 THEN 1007
995 LET I=1
1000 PRINT : PRINT : PRINT "WRONG ANSWER-TRY AGAIN"
1005 GOTO 940
1007 PRINT "SUPER MECHANIC!!!!!"
1010 PRINT : PRINT : PRINT " A HEAT EXCHANGER USED IN A GAS-
    TURBINE ENGINE TRANSFERS HEAT ENERGY TO "
1020 PRINT : PRINT : PRINT "1. THE COMPRESSED AIR."
1030 PRINT : PRINT : PRINT "2. THE EXHAUST STACK."
1040 PRINT : PRINT : PRINT "3. A RADIATOR."
1050 PRINT : PRINT : PRINT "4. A TURBO CHARGER."
1060 INPUT X
1070 IF X=4 THEN 1080
1075 LET J=1
1076 PRINT : PRINT : PRINT "WRONG ANSWER- TRY AGAIN"
1077 GOTO 1010
1080 LET X = A + B + C + D + E + F + G + H + I + J
1090 LET X = 100 - 10 * X
1095 PRINT : PRINT : PRINT " YOUR PERCENT OF CORRECT RESPONSES= "
    ;X;"%"
1096 PRINT : PRINT : PRINT
1097 PRINT " DRIVERS START YOUR ENGINES!!!!"
2000 END
```

HORSEPOWER

COMPUTER: HP 2000 Timeshare

LANGUAGE: HP BASIC

AUTHOR: Scott Figg
J. B. Young Junior High
Davenport, Iowa

APPLICATION: Energy and Power

INTRODUCTION: This program helps the student in figuring Engine, Brake, and Rated Horsepower. The students must enter the proper inputs and give his/her solution to the problem. The computer will then tell the student whether he/she was right or wrong giving him/her the right answer, if wrong. The student should have some background with the three types of horsepower before attempting this program. The formulas used in this program are shown below and should be given to the student.

1. Horsepower=(distance-force/time)/(550 foot pounds/second)
2. Brake Horsepower=(½xPIxRxLxW)/33,000
   PI=3.14
   R=Engine RPM or speed
   L=Length of Beam from crankshaft to scale in feet
   W=Weight on scale in pounds
3. Rated Horsepower=0.80xBrake Horsepower

THE PROGRAM:

```
 10 REM *** YES-NO STRING
 20 DIM B$[10]
 30 REM *** NAME STRING
 40 DIM  N$[60]
 50 REM *** YES-NO STRING
 60 PRINT LIN(2)
 70 DIM A$[10]
 80 PRINT "HELLO. WHAT IS YOUR NAME";
 90 INPUT N$
100 PRINT LIN(2)
110 PRINT "HI ";N$
120 PRINT "THIS IS A PROGRAM TO HELP YOU FIGURE ENGINE HORSE
        POWER,"
130 PRINT "BRAKE HORSEPOWER, AND RATED HORSEPOWER."
140 PRINT LIN(2)
150 PRINT "ENGINE HORSEPOWER WAS ORIGINALLY DEFINED BY JAMES
        WATT WHEN"
160 PRINT "HE NEEDED SOME WAY TO MEASURE THE OUTPUT OF ONE
        OF HIS EARLY"
170 PRINT "STEAM ENGINES.  HE SAID 1 HORSEPOWER IS WHEN A HORSE
        CAN LIFT"
180 PRINT "100 POUNDS, 300 FEET, IN 1 MINUTE OR STATED IN OTHER
        TERMS."
```


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```
190 PRINT "550 FOOT-POUNDS/SECOND, FROM THAT, WE GET THE
        FORMULA:"
200 PRINT
210 PRINT "HORSEPOWER=(DISTANCE-FORCE/TIME)/(550 FOOT-POUNDS/
        SECOND)"
220 PRINT
230 PRINT "NOTE *** PLEASE WRITE THESE FORMULAS DOWN";N$;","
240 PRINT "YOU WILL NEED TO USE THEM LATER IN THE PROGRAM."
250 PRINT LIN(3)
260 PRINT "WHEN YOU ARE READY FOR MORE INFORMATION PRESS
        RETURN KEY."
270 LINPUT M$
280 PRINT LIN(3)
290 PRINT "BRAKE HORSEPOWER IS CONSIDERED TO BE THE ACTUAL
        HORSEPOWER"
300 PRINT "THAT IS DELIVERED TO THE CRANKSHAFT OF THE ENGINE."
310 PRINT
320 PRINT "NOTE *** BRAKE HORSEPOWER IS NOT ALWAYS THE SAME,
        IT"
330 PRINT "INCREASES WITH ENGINE SPEED."
340 PRINT
350 PRINT "THE FORMULA WE WILL USE FOR BRAKE HORSEPOWER IS:"
360 PRINT
370 PRINT "BRAKE HORSEPOWER=(2xPIxRxLxW)/33000"
380 PRINT TAB(6) "PI=3.14"
390 PRINT TAB(6) "R=ENGINE RPM OR SPEED"
400 PRINT TAB(6) "L=LENGTH OF BEAM FROM CRANKSHAFT TO SCALE
        IN FEET"
410 PRINT TAB(6) "W=WEIGHT ON THE SCALE IN POUNDS"
420 PRINT LIN(3)
430 PRINT "WHEN YOU ARE READY FOR MORE INFORMATION PRESS
        RETURN KEY."
440 LINPUT M$
450 PRINT LIN(3)
460 PRINT "RATED HORSEPOWER IS, AS A GENERAL RULE, CONSIDERED
        TO BE 80%"
470 PRINT "OF THE HIGHEST BRAKE HORSEPOWER.  THIS IS DONE TO
        AVOID"
480 PRINT "EXCESSIVE WEAR ON THE ENGINE'S BEARINGS.  THEREFORE
        THE FORMULA"
490 PRINT "WE USE FOR RATED HORSEPOWER IS:"
500 PRINT
510 PRINT "RATED HORSEPOWER=.80xBRAKE HORSEPOWER"
520 PRINT LIN(5)
530 PRINT "WHEN YOU ARE READY FOR MORE INFORMATION PRESS
        RETURN KEY."
540 LINPUT M$
550 PRINT LIN(3)
560 PRINT "YOU WILL BE ASKED TO HELP FIGURE THE ANSWERS ";N$;
570 PRINT "SO GET YOUR PAPER AND PENCIL."
580 PRINT
590 PRINT "OK ";N$;" LET'S BEGIN"
```

```
600 PRINT LIN(2)
610 PRINT "DO YOU WANT TO:"
620 PRINT TAB(16);"1 ** FIGURE ENGINE HORSEPOWER?"
630 PRINT TAB(16);"2 ** FIGURE BRAKE AND RATED HORSEPOWER?"
640 PRINT TAB(16);"3 ** STOP?"
650 PRINT
660 INPUT X
670 PRINT LIN(4)
680 GOTO X OF 710,950,1680
690 PRINT "YOUR ANSWER MUST BE 1,2,OR 3."
700 GOTO 610
710 REM ** COMPUTATION OF ENGINE HORSEPOWER
720 PRINT "YOU HAVE DECIDED TO FIGURE ENGINE HORSEPOWER ";N$;
      " PLEASE"
730 PRINT "ENTER DISTANCE-FORCE IN FOOT-POUNDS AND TIME IN
      SECONDS."
740 PRINT
750 PRINT "WHAT IS THE DISTANCE-FORCE";
760 INPUT B
770 PRINT
780 PRINT "WHAT IS THE TIME";
790 INPUT C
800 PRINT
810 PRINT "OK ";N$;" NOW I WANT YOU TO GIVE ME YOUR ANSWER
      USING"
820 PRINT "THE DISTANCE-FORCE, TIME YOU JUST ENTERED, AND THE"
830 PRINT "FORMULA FOR ENGINE HORSEPOWER";
840 INPUT D
850 LET N=(B/C)/550
860 PRINT
870 IF D<=N+.1 AND D>=N-.1 THEN 920
880 PRINT N$;" YOU MADE AN ERROR, THE CORRECT ANSWER IS ";N
890 PRINT "HORSEPOWER"
900 PRINT "PLEASE RE-CHECK YOUR FIGURES."
910 GOTO 1520
920 PRINT "GOOD JOB ";N$;" YOU GOT THE RIGHT ANSWER."
930 PRINT LIN(2)
940 GOTO 1520
950 REM *** COMPUTATION OF BRAKE AND RATED HORSEPOWER
960 PRINT "YOU HAVE DECIDED TO FIGURE BRAKE AND RATED HORSE
      POWER"
970 PRINT N$;", PLEASE ENTER RPM, LENGTH OF BEAM IN FEET, AND"
980 PRINT "WEIGHT IN POUNDS."
990 PRINT
1000 PRINT "WHAT IS THE RPM";
1010 INPUT E
1020 PRINT
1030 PRINT "WHAT IS THE LENGTH";
1040 INPUT F
1050 PRINT
1060 PRINT "WHAT IS THE WEIGHT";
1070 INPUT G
1080 PRINT LIN(2)
```


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```
1090 PRINT "OK ";N$;" NOW I WANT YOU TO GIVE ME YOUR ANSWER
     USING"
1100 PRINT "THE RPM, LENGTH, AND WEIGHT YOU JUST ENTERED AND
     THE"
1110 PRINT "FORMULAS FOR BRAKE AND RATED HORSEPOWER."
1120 PRINT
1130 PRINT "WHAT IS THE BRAKE HORSEPOWER";
1140 INPUT H
1150 PRINT
1160 PRINT "WHAT IS THE RATED HORSEPOWER";
1170 INPUT I
1180 PRINT LIN(2)
1190 LET P=(2*3.14*E*F*G)/33000.
1200 IF H<=P+.1 AND H>=P-.1 THEN 1240
1210 GOTO 1270
1220 IF I<=(.80*P)+.1 AND I>=(.8*P)-.1 THEN 1300
1230 GOTO 1350
1240 PRINT "GOOD JOB ";N$;" YOU GOT THE RIGHT ANSWER FOR BRAKE"
1250 PRINT "HORSEPOWER";
1260 GOTO 1220
1270 PRINT N$;" YOU MADE AN ERROR IN FIGURING BRAKE"
1280 PRINT "HORSEPOWER";
1290 GOTO 1220
1300 IF H<=P+.1 AND H>=P-.1 THEN 1320
1310 GOTO 1400
1320 PRINT " AND RATED HORSEPOWER."
1330 PRINT LIN(2)
1340 GOTO 1430
1350 IF H<=P+.1 AND H>=P.1 THEN 1370
1360 GOTO 1320
1370 PRINT " BUT, YOU MADE AN ERROR IN FIGURING RATED HORSE
     POWER."
1380 PRINT LIN(2)
1390 GOTO 1430
1400 PRINT " BUT, YOU FIGURED RATED HORSEPOWER CORRECTLY."
1410 PRINT LIN(2)
1420 GOTO 1430
1430 REM *** PRINT ANSWER FOR BRAKE HORSEPOWER
1440 IF H<=P+.1 AND H>=P-.1 THEN 1470
1450 PRINT "THE CORRECT ANSWER FOR BRAKE HORSEPOWER IS ";P
1460 PRINT
1470 REM ***PRINT THE ANSWER FOR RATED HORSEPOWER
1480 IF I<=(.8*P)+.1 and I>=(.8*P)-.1 THEN 1520
1490 PRINT "THE CORRECT ANSWER FOR RATED HORSEPOWER IS ";.8*P
1500 PRINT
1510 GOTO 1520
1520 REM *** ANOTHER PROBLEM?
1530 PRINT "DO YOU WANT TO TRY ANOTHER PROBLEM ";N$;
1540 INPUT A$
1550 IF A$="YES" THEN 1600
1560 IF A$="NO" THEN1680
1570 PRINT "YOU MUST ANSWER YES OR NO."
```

```
1580 GOTO 1530
1590 REM ** REMEMBER FORMULAS
1600 PRINT LIN(2)
1610 PRINT "DO YOU REMEMBER THE FORMULAS ";N$;
1620 INPUT B$
1630 PRINT LIN(4)
1640 IF B$="YES" THEN 610
1650 IF B$="NO" THEN 140
1660 PRINT "YOU MUST ANSWER YES OR NO."
1670 GOTO 1610
1680 END
```

INDUCTIVE REACTANCE

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Marvin Berg
Fort Dodge Senior High School
Fort Dodge, Iowa

APPLICATION: Energy and Power

INTRODUCTION: This program may be used in an electronics course when studying AC circuits. This routine may be used to determine the inductive reactance, impedance, current and phase relationship of a RL circuit. The values of resistance, inductance, frequency and voltage must be provided to receive the complete sequence of responses.

The user of this routine must be familiar with the values for each of the variables in a RL circuit because input and output data should use E notation where appropriate. E notation is similar to scientific notation. An example for units smaller than one would indicate 6 millihenries as 6E-3. Larger numbers such as one million may be entered as 1E6.

This routine may be used when the objective is problem-solving RL circuits. Other related programs in this series are Capacitive Reactance and Resonant Circuits.

THE PROGRAM:

```
 10 PRINT TAB(10)"THIS IS A ROUTINE TO DETERMINE THE INDUCTIVE
      REACTANCE(X)"
 20 PRINT TAB(5)"AND IMPEDANCE(Z) OF AN RL CIRCUIT. YOU WILL ALSO
      RECEIVE"
 30 PRINT TAB(5)"THE CURRENT(I) AND THE COSINE(COS). DO NOT
      ENTER A "
 40 PRINT TAB(5)"NUMBER WITH A PREFIX. E NOTATION MAY BE USED."
 50 PRINT LIN(1)
 60 PRINT TAB(8)"WHAT IS THE VALUE OF THE RESISTANCE?";
 70 INPUT R
 80 PRINT TAB(8)"WHAT IS THE VALUE OF THE INDUCTANCE?";
 90 INPUT L
100 PRINT TAB(8)"WHAT IS THE FREQUENCY OF THE CIRCUIT?";
110 INPUT F
120 PRINT TAB(8)"WHAT IS THE VOLTAGE APPLIED TO THE CIRCUIT?";
130 INPUT E
140 LET X=2*3.1416*F*L
150 LET Z=SQR(R**2+X**2)
160 LET I=E/Z
170 LET C=R/Z
180 PRINT LIN(2)
190 PRINT TAB(8)"THE VALUES FOR YOUR VARIABLES ARE:"
200 PRINT TAB(20)"X= ";X
```

```
210 PRINT TAB(20)"Z= ";Z
220 PRINT TAB(20)"I= ";I
230 PRINT TAB(20)"COS= ";C
240 PRINT LIN(1)
250 PRINT TAB(5)"DO YOU WANT TO CONTINUE WITH ANOTHER CIRCUIT?"
260 DIM N$(3)
270 INPUT N$
280 IF N$="YES" THEN 50
290 IF N$="NO" THEN 320
300 PRINT TAB(10)"YOU MUST RESPOND WITH EITHER YES OR NO."
310 GOTO 270
320 END
```


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*** OHM'S LAW ***

COMPUTER: HP 2000 Timesharing; Apple; Informer

LANGUAGE: Microsoft BASIC; Informer BASIC; Applesoft BASIC

AUTHOR: John Lyman
Kennedy High School
Cedar Rapids, Iowa

APPLICATIONS: Energy and Power

INTRODUCTION: "Ohm's Law" takes Ohm's Law and allows the user to solve for the unknown variable in the equation. This program follows a problem-solving approach, but uses simple computer programing techniques which can be followed in the line by line programing.

The intent of this program is to have students support their study of Ohm's Law by checking problems they have solved. It can be helpful to both the student and teacher by allowing more time for instruction and requiring less time for correcting problems.

Variations of the program can be added by the more advanced students and will enhance the student's understanding of computer applications.

THE PROGRAM:

```
  5 REM  OHM'S LAW PROGRAM BY JOHN LYMAN
  6 REM  JULY, 1979
 10 PRINT TAB( 12)"*** OHM'S LAW ***"
 15 PRINT
 16 PRINT
 20 PRINT "    TO FIND THE UNKNOWN VALUE IN"
 21 PRINT "    OHM'S LAW, SELECT ONE OF THE "
 22 PRINT "    FOLLOWING."
 25 PRINT "     1. VOLTAGE"
 40 PRINT "     2. AMPERAGE"
 50 PRINT "     3. RESISTANCE"
 60 PRINT "     4. I'M FINISHED"
 65 PRINT
 70 INPUT X
 71 PRINT
 80 ON X GOTO 500,600,700,800
500 PRINT "  TO FIND VOLTAGE, GIVE VALUES"
501 PRINT " OF AMPERAGE & RESISTANCE."
510 PRINT
520 PRINT "AMPERAGE =  ";: INPUT I
530 PRINT
540 PRINT "RESISTANCE =  ";: INPUT R
550 PRINT
560 LET E = I * R: PRINT "VOLTAGE =  ";E
```

```
570 PRINT
580 PRINT "  DO YOU WISH TO WORK ANOTHER"
581 PRINT "  VOLTAGE PROBLEM?";: INPUT A$
585 PRINT
590 LET Y$ = "YES"
591 IF A$ = "Y" THEN 500
592 IF A$ = Y$ THEN 500
593 IF A$ <> "Y" THEN 20
595 PRINT
600 PRINT "  TO FIND AMPERAGE, GIVE VALUES"
601 PRINT "OF VOLTAGE & RESISTANCE."
610 PRINT
620 PRINT "  VOLTAGE =  ";: INPUT E
630 PRINT
640 PRINT "  RESISTANCE =  ";: INPUT R
650 PRINT
660 LET I = E / R: PRINT "  AMPERAGE =  ";I
670 PRINT
680 PRINT "  DO YOU WISH TO WORK ANOTHER"
681 PRINT "AMPERAGE PROBLEM?": INPUT B$
682 PRINT
691 IF B$ = "Y" THEN 600
692 IF B$ = "YES" THEN 600
693 IF B$ <> "Y" THEN 20
700 PRINT "  TO FIND RESISTANCE, GIVE"
701 PRINT "VALUES OF AMPERAGE & VOLTAGE."
710 PRINT
720 PRINT "  AMPERAGE =  ";: INPUT I
730 PRINT
740 PRINT "  VOLTAGE =  ";: INPUT E
750 PRINT
760 LET R = E / I: PRINT "  RESISTANCE =  "R
770 PRINT
780 PRINT "  DO YOU WISH TO WORK ANOTHER"
781 PRINT "RESISTANCE PROBLEM?": INPUT C$
791 IF C$ = "Y" THEN 700
792 IF C$ = "YES" THEN 700
793 IF C$ <> "Y" THEN 20
800 PRINT
801 PRINT " I HOPE THIS PROGRAM HAS HELPED"
802 PRINT " YOU.  HAVE A NICE DAY."
803 END
```


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OHM'S-WATT'S LAW PROBLEMS

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: Rex Engelkemier
Valley High School
West Des Moines, Iowa

APPLICATION: Power and Energy

INTRODUCTION: Ohm's-Watt's Law Problems
Level: Junior and Senior High beginning electricity or electronics class.
Material Needed: Worksheet of problems and writing utensil.
Usage: This program can be used to familiarize students with the relationship between Ohm's Law and Watt's Law while solving problems involving the use of the two laws. It requires correct spelling of the terms and identification of formulas. This program will save the instructor time in checking papers and provide learner reinforcement of the concepts involved.

THE PROGRAM:

```
  1 PRINT : PRINT : PRINT "*  *  *  *  *  *  *  *  *  *  *"
  2 PRINT : PRINT : PRINT TAB( 7)"OHM'S-WATT'S LAW PROBLEMS"
  3 PRINT : PRINT TAB( 11)"BY REX ENGELKEMIER"
  4 PRINT : PRINT "*  *  *  *  *  *  *  *  *  *  *"
 10 PRINT : PRINT "THIS PROGRAM WILL SOLVE ANY COMBINATION OF
    OHM'S OR WATT'S LAW PROBLEMS.  WHEN SELECTING THE
    UNKNOWN VALUE, YOU MUST SPELL THE WORD CORRECTLY
    OR THE PROGRAM WILL END.  TO RESTART, TYPE IN RUN."
 11 FOR X=1 TO 10000: NEXT X
 12 PRINT : PRINT : PRINT "1. SELECT THE UNKNOWN VALUE NEEDED TO
    BE FOUND AND ENTER THAT WORD."
 13 PRINT : PRINT "2. CHOOSE THE FORMULA THAT INCLUDES THE TWO
    VALUES GIVEN IN YOUR PROBLEM."
 14 PRINT : PRINT "3. ENTER THE TWO VALUES IN THE ORDER THEY ARE
    REQUESTED."
 15 PRINT : PRINT "4. REPEAT THE SEQUENCE FOR MORE ANSWERS OR
    STOP BY ENTERING ANY LETTER."
 20 PRINT : PRINT
 25 PRINT TAB( 5)"WHAT ARE YOU TRYING TO FIND?"
 30 PRINT : PRINT TAB( 15)"VOLTAGE"
 31 PRINT : PRINT TAB( 15)"AMPERAGE"
 32 PRINT : PRINT TAB( 15)"RESISTANCE"
 33 PRINT : PRINT TAB( 15)"WATTAGE"
 40 INPUT X$
 50 IF X$="VOLTAGE" THEN 100
 60 IF X$="AMPERAGE" THEN 400
 70 IF X$="RESISTANCE" THEN 700
```

```
 80 IF X$="WATTAGE" THEN 1000
 90 GOTO 2000
100 PRINT : PRINT TAB( 10)1". E=SQR(P*R)"
102 PRINT : PRINT TAB( 10)2". E=I*R"
103 PRINT : PRINT TAB( 10)3". E=P/I"
110 PRINT : PRINT : PRINT : PRINT "WHICH FORMULA DO YOU WANT TO
        USE?"
115 INPUT Z
120 ON Z GOTO 125,195,295
125 PRINT
130 PRINT "WHAT IS THE RESISTANCE OF YOUR CIRCUIT?"
140 INPUT R
145 PRINT
150 PRINT "WHAT IS THE WATTAGE OF YOUR CIRCUIT?"
160 INPUT P
170 LET E=SQR(P*R)
175 PRINT
180 PRINT TAB( 10)"E= ";E;" VOLTS"
185 FOR X=1 TO 5000: NEXT X
190 GOTO 20
195 PRINT
200 PRINT "WHAT IS THE RESISTANCE OF YOUR CIRCUIT?"
210 INPUT R
215 PRINT
220 PRINT "WHAT IS THE AMPERAGE OF YOUR CIRCUIT?"
230 INPUT I
240 LET E=I*R
250 GOTO 180
295 PRINT
300 PRINT "WHAT IS THE WATTAGE OF YOUR CIRCUIT?"
310 INPUT P
315 PRINT
320 PRINT "WHAT IS THE AMPERAGE OF YOUR CIRCUIT?"
330 INPUT I
340 LET E=P/I
350 GOTO 180
400 PRINT : PRINT TAB( 10)1". I=E/R"
401 PRINT : PRINT TAB( 10)2". I=P/E"
402 PRINT : PRINT TAB( 10)3". I=SQR(P/R)"
403 PRINT
410 PRINT "WHICH FORMULA DO YOU WANT TO USE?"
415 INPUT Y
420 ON Y GOTO 425,495,595
425 PRINT
430 PRINT "WHAT IS THE VOLTAGE OF YOUR CIRCUIT?"
440 INPUT E
445 PRINT
450 PRINT "WHAT IS THE RESISTANCE OF YOUR CIRCUIT?"
460 INPUT R
470 LET I=E/R
475 PRINT
```


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```
480 PRINT TAB( 10)"I= ";I;" AMPS"
485 FOR X=1 TO 5000:  NEXT X
490 GOTO 20
495 PRINT
500 PRINT "WHAT IS THE WATTAGE OF YOUR CIRCUIT?"
510 INPUT P
515 PRINT
520 PRINT "WHAT IS THE VOLTAGE OF YOUR CIRCUIT?"
530 INPUT E
540 LET I=P/E
550 GOTO 475
595 PRINT
600 PRINT "WHAT IS THE WATTAGE OF YOUR CIRCUIT?"
610 INPUT P
615 PRINT
620 PRINT "WHAT IS THE RESISTANCE OF YOUR CIRCUIT?"
630 INPUT R
640 LET I=SQR(P/R)
650 GOTO 475
700 PRINT : PRINT TAB( 10)1". R=E/I"
701 PRINT : PRINT TAB( 10)2". R=P/(I*I)
702 PRINT : PRINT TAB( 10)3". R=(E*E)/P"
703 PRINT
710 PRINT "WHICH FORMULA DO YOU WANT TO USE?"
715 INPUT X
720 ON X GOTO 725,795,895
725 PRINT
730 PRINT "WHAT IS THE VOLTAGE OF YOUR CIRCUIT?"
740 INPUT E
745 PRINT
750 PRINT "WHAT IS THE AMPERAGE OF YOUR CIRCUIT?"
760 INPUT I
770 LET R=E/I
775 PRINT
780 PRINT TAB( 10)"R= ";R;" OHMS"
785 FOR X=1 TO 5000:  NEXT X
790 GOTO 20
795 PRINT
800 PRINT "WHAT IS THE WATTAGE OF YOUR CIRCUIT?"
810 INPUT P
815 PRINT
820 PRINT "WHAT IS THE AMPERAGE OF YOUR CIRCUIT?"
830 INPUT I
840 LET R=P/(I*I)
850 GOTO 775
895 PRINT
900 PRINT "WHAT IS THE VOLTAGE OF YOUR CIRCUIT?"
910 INPUT E
915 PRINT
920 PRINT "WHAT IS THE WATTAGE OF YOUR CIRCUIT?"
930 INPUT P
940 LET R=(E*E)/P
```

```
 950 GOTO 775
1000 PRINT : PRINT TAB( 10)1". P=I*E"
1002 PRINT : PRINT TAB( 10)2". P=(I*I)*R"
1003 PRINT : PRINT TAB( 10)3". P=(E*E)/R"
1004 PRINT
1010 PRINT "WHICH FORMULA DO YOU WANT TO USE?"
1015 INPUT W
1020 ON W GOTO 1025,1095,1195
1025 PRINT
1030 PRINT "WHAT IS THE AMPERAGE OF YOUR CIRCUIT?"
1040 INPUT I
1045 PRINT
1050 PRINT "WHAT IS THE VOLTAGE OF YOUR CIRCUIT?"
1060 INPUT E
1070 LET P=I*E
1075 PRINT
1080 PRINT TAB( 10)"P= ";P;" WATTS"
1085 FOR X=1 TO 5000:  NEXT X
1090 GOTO 20
1095 PRINT
1100 PRINT "WHAT IS THE AMPERAGE OF YOUR CIRCUIT?"
1110 INPUT I
1115 PRINT
1120 PRINT "WHAT IS THE RESISTANCE OF YOUR CIRCUIT?"
1130 INPUT R
1140 LET P=(I*I)*R
1150 GOTO 1075
1195 PRINT
1200 PRINT "WHAT IS THE VOLTAGE OF YOUR CIRCUIT?"
1210 INPUT E
1215 PRINT
1220 PRINT "WHAT IS THE RESISTANCE OF YOUR CIRCUIT?"
1230 INPUT R
1240 LET P=(E*E)/R
1250 GOTO 1075
2000 PRINT : PRINT : PRINT "IT WAS FUN HELPING YOU, GOOD DAY."
2001 END
```

RESISTOR COLOR DECODING

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Don Foth
Plainfield Community School
Plainfield, Iowa

APPLICATION: Energy and Power

INTRODUCTION: This program will give the ohmic value of any given resistor color code. It is designed to be used in a basic electronics course as a way for the students to check their own work or as a reinforcement tool. A possible use might be to have students identify the resistance of a selection of resistors, using a color code chart and recording the values. The students would then go to the computer to check their accuracy. Another use might be in a game situation, where a student using a chart, pad and pencil "races" another student using this computer program. Each student would take turns using the computer and chart to figure resistance.

THE PROGRAM:

```
 10 DIM C$[10]
 20 PRINT "THIS IS A PROGRAM TO GIVE THE OHMIC VALUE OF A
        RESISTOR"
 30 PRINT "IF GIVEN THE COLOR CODE ON THE RESISTOR."
 40 PRINT
 50 PRINT
 60 PRINT "WHAT IS THE FIRST COLOR BAND ON YOUR RESISTOR"
 70 PRINT
 80 PRINT   (TYPE IN THE COLOR NAME,EX: RED)";
 90 INPUT C$
100 PRINT
110 PRINT
120 IF C$="BLACK" THEN 230
130 IF C$="BROWN" THEN 250
140 IF C$="RED" THEN 270
150 IF C$="ORANGE" THEN 290
160 IF C$="YELLOW" THEN 310
170 IF C$="GREEN" THEN 330
180 IF C$="BLUE" THEN 350
190 IF C$="PURPLE" THEN 370
200 IF C$="GRAY" THEN 390
210 IF C$="WHITE" THEN 410
220 GOTO 60
230 LET X=0
240 GOTO 430
250 LET X=1
260 GOTO 430
```

```
270 LET X=2
280 GOTO 430
290 LET X=3
300 GOTO 430
310 LET X=4
320 GOTO 430
330 LET X=5
340 GOTO 430
350 LET X=6
360 GOTO 430
370 LET X=7
380 GOTO 430
390 LET X=8
400 GOTO 430
410 LET X=9
420 GOTO 430
430 DIM S$[10]
440 PRINT "WHAT IS THE SECOND COLOR BAND";
450 INPUT S$
460 PRINT
470 PRINT
480 IF S$="BLACK" THEN 590
490 IF S$="BROWN" THEN 610
500 IF S$="RED" THEN 630
510 IF S$="ORANGE" THEN 650
520 IF S$="YELLOW" THEN 670
530 IF S$="GREEN" THEN 690
540 IF S$="BLUE" THEN 710
550 IF S$="PURPLE" THEN 730
560 IF S$="GRAY" THEN 750
570 IF S$="WHITE" THEN 770
580 GOTO 440
590 LET Y=0
600 GOTO 800
610 LET Y=1
620 GOTO 800
630 LET Y=2
640 GOTO 800
650 LET Y=3
660 GOTO 800
670 LET Y=4
680 GOTO 800
690 LET Y=5
700 GOTO 800
710 LET Y=6
720 GOTO 800
730 LET Y=7
740 GOTO 800
750 LET Y=8
760 GOTO 800
770 LET Y=9
780 GOTO 800
```

```
790 DIM M$[10]
800 PRINT "WHAT IS THE THIRD COLOR BAND OF YOUR RESISTOR";
810 INPUT M$
820 PRINT
830 PRINT
840 IF M$="BLACK" THEN 940
850 IF M$="BROWN" THEN 960
860 IF M$="RED" THEN 980
870 IF M$="ORANGE" THEN 1000
880 IF M$="YELLOW" THEN 1020
890 IF M$="GREEN" THEN 1040
900 IF M$="BLUE" THEN 1060
910 IF M$="GOLD" THEN 1080
920 IF M$="SILVER" THEN 1100
930 GOTO 800
940 LET A=1
950 GOTO 1140
960 LET A=10
970 GOTO 1140
980 LET A=100
990 GOTO 1140
1000 LET A=1000
1010 GOTO 1140
1020 LET A=10000
1030 GOTO 1140
1040 LET A=100000.
1050 GOTO 1140
1060 LET A=1.E+06
1070 GOTO 1140
1080 LET A=.1
1090 GOTO 1140
1100 LET A=.01
1120 GOTO 1140
1130 DIM T$[10]
1140 PRINT "WHAT IS THE FOURTH COLOR BAND ON YOUR RESISTOR";
1150 INPUT T$
1160 PRINT
1170 PRINT
1180 PRINT
1190 PRINT
1200 IF T$="BODY" THEN 1240
1210 IF T$="SILVER" THEN 1260
1220 IF T$="GOLD" THEN 1280
1230 GOTO 1140
1240 LET D=20
1250 GOTO 1300
1260 LET D=10
1270 GOTO 1300
1280 LET D=5
```

```
1290 GOTO 1300
1300 PRINT C$,S$,M$,T$
1310 PRINT X,Y,A,D
1320 PRINT
1330 PRINT
1340 LET R=(X*10+Y)*A
1350 PRINT "YOUR RESISTOR VALUE IS";R;"OHMS."
1360 PRINT "THE PERCENT OF TOLERANCE IS +-";D
1370 PRINT
1380 PRINT
1390 DIM G$[11]
1400 PRINT "DO YOU WANT THIS PROGRAM AGAIN? (Y OR N)";
1410 INPUT G$
1420 IF G$="Y" THEN 50
1430 PRINT
1440 PRINT
1450 PRINT
1460 PRINT "DON'T RESIST YOUR URGE TO COME BACK!!"
1470 END
```


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RESONANT CIRCUITS

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Marvin Berg
Fort Dodge Senior High School
Fort Dodge, Iowa

APPLICATION: Energy and Power

INTRODUCTION: This program may be used to determine the resonant frequency of a tuned circuit. The values of inductance, capacitance and frequency may be calculated for various filter circuits. The user must be cognizant of values for each of the three variables since prefixes such as milli, micro and others must be converted to the magnitude of units.

Because of the magnitude of the variables, the operator should be familiar with E notation of either entering or retrieving data. Other related programs in this manual are Capacitive Reactance and Inductive Reactance.

THE PROGRAM:

```
 10 DIM N$(3)
 20 PRINT TAB(10)"THIS IS A PROGRAM TO DETERMINE THE RESONANT
        FREQUENCY OF"
 30 PRINT TAB(5)"A CIRCUIT.  IF YOU KNOW THE FREQUENCY AND WANT
        TO DETERMINE"
 40 PRINT TAB(5)"THE VALUE OF THE CIRCUIT COMPONENTS, YOU MAY
        OBTAIN EITHER"
 50 PRINT TAB(5)"THE VALUE OF THE INDUCTANCE OR CAPACITANCE.
        THE"
 60 PRINT TAB(5)"FOLLOWING THREE VARIABLES ARE USED."
 70 PRINT LIN(1)
 80 PRINT TAB(20)"1.  INDUCTANCE"
 90 PRINT TAB(20)"2.  CAPACITANCE"
100 PRINT TAB(20)"3.  RESONANT FREQUENCY"
110 PRINT LIN(1)
120 PRINT TAB(8)"WHICH NUMBER (INDICATING THE UNKNOWN) DO YOU
        WANT"
130 PRINT TAB(8)"TO SELECT?";
140 INPUT N
150 IF N=1 THEN 390
160 IF N=2 THEN 510
170 IF N=3 THEN 200
180 PRINT TAB(10)"YOU MUST CHOOSE EITHER 1,2 OR 3.";
190 GOTO 120
200 PRINT LIN(1)
210 PRINT TAB(10)"THIS IS A ROUTINE TO DETERMINE THE RESONANT
        FREQUENCY OF"
```

```
220 PRINT TAB(5)"LC CIRCUITS.  YOU WILL NEED TO KNOW THE VALUE
      OF INDUCTANCE"
230 PRINT TAB(5)"IN HENRIES AND THE VALUE OF CAPACITANCE IN
      FARADS."
240 PRINT LIN(1)
250 PRINT TAB(8)"WHAT IS THE VALUE OF THE INDUCTOR?";
260 INPUT L
270 PRINT TAB(8)"WHAT IS THE VALUE OF THE CAPACITOR?";
280 INPUT C
290 LET F=1/(2*3.1416*SQR(L*C))
300 PRINT LIN(1)
310 PRINT TAB(20)"RESONANT FREQUENCY= ";F
320 PRINT LIN(1)
330 PRINT TAB(5)"DO YOU HAVE ANOTHER CIRCUIT PROBLEM TO SOLVE?";
340 INPUT N$
350 IF N$="YES" THEN 70
360 IF N$="NO" THEN 630
370 PRINT TAB(10)"YOU MUST CHOOSE EITHER YES OR NO."
380 GOTO 330
390 PRINT LIN(1)
400 PRINT TAB(10)"THIS IS A ROUTINE TO DETERMINE THE INDUCTANCE
      IF THE"
410 PRINT TAB(5)"CAPACITANCE AND FREQUENCY ARE KNOWN."
420 PRINT LIN(1)
430 PRINT TAB(8)"WHAT IS THE VALUE OF THE CAPACITOR?";
440 INPUT C
450 PRINT TAB(8)"WHAT IS THE VALUE OF THE RESONANT FREQUEN
      CY?";
460 INPUT F
470 LET L=1/(4*3.1416**2*C*F**2)
480 PRINT LIN(1)
490 PRINT TAB(20)"INDUCTANCE= ";L
500 GOTO 320
510 PRINT LIN(1)
520 PRINT TAB(10)"THIS IS A ROUTINE TO DETERMINE THE CAPACITANCE
      IF THE"
530 PRINT TAB(5)"INDUCTANCE AND FREQUENCY ARE KNOWN."
540 PRINT LIN(1)
550 PRINT TAB(8)"WHAT IS THE VALUE OF THE INDUCTOR?";
560 INPUT L
570 PRINT TAB(8)"WHAT IS THE VALUE OF THE RESONANT FREQUENCY?";
580 INPUT F
590 LECT C=1/(4*3.1416**2*L*F**2)
600 PRINT LIN(1)
610 PRINT TAB(20)"CAPACITANCE= ";C
620 GOTO 320
630 END
```


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TORQUE

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Scott Figg
J. B. Young Junior High
Davenport, Iowa

APPLICATION: Energy and Power

INTRODUCTION: This program helps the student in figuring torque. The student must enter force and distance (in either English or Metric units) and give his/her answer. The computer will then tell the student whether he/she was right or wrong giving him/her the right answer, if wrong. The student should have some background with torque, force and distance before attempting this program. The formula used in this program is shown below and should be given to the student.

Torque = Force x Distance

THE PROGRAM:

```
 10 REM *** NAME STRING
 20 DIM N$[20]
 30 REM *** POUND-NEWTON
 40 DIM B$[15]
 50 REM *** YES-NO STRING
 60 DIM A$[10]
 70 REM *** ENGLISH-METRIC STRING
 80 DIM C$[10]
 90 REM *** FOOT-METRE STRING
100 DIM D$[10]
110 PRINT "HELLO. WHAT IS YOUR NAME";
120 INPUT N$
130 PRINT LIN(2)
140 PRINT "HI ";N$
150 PRINT "THIS IS A PROGRAM TO HELP YOU FIGURE TORQUE IN EITHER
        ENGLISH"
160 PRINT "OR METRIC UNITS.  TORQUE IS A TURNING OR TWISTING
        FORCE.  WE"
170 PRINT "USE TORQUE TO TIGHTEN A BOLT OR NUT OR, WE CAN USE
        TORQUE"
180 PRINT "TO MEASURE THE TURNING FORCE OF AN ENGINE'S CRANK
        SHAFT.  THE"
190 PRINT "EQUATION WE WILL USE IS:"
200 PRINT LIN(2)
210 PRINT "TORQUE = FORCE X DISTANCE"
220 PRINT LIN(2)
230 PRINT "YOU WILL BE ASKED TO HELP FIGURE THE ANSWERS ";N$;",
        SO GET"
240 PRINT "YOUR PENCIL AND PAPER."
```

```
250 PRINT
260 PRINT "OK ";N$;", LET'S BEGIN"
270 PRINT
280 PRINT "DO YOU WANT TO:"
290 PRINT TAB(16);"1 ** USE ENGLISH UNITS?"
300 PRINT TAB(16);"2 ** USE METRIC UNITS?"
310 PRINT TAB(16);"3 ** STOP?"
320 PRINT TAB(16);"(CHOOSE 1,2,or 3)"
330 INPUT X
340 PRINT LIN(4)
350 IF X=1 THEN 680
360 IF X=2 THEN 730
370 IF X=3 THEN 930
380 PRINT "YOUR ANSWER MUST BE 1,2,OR3."
390 GOTO 280
400 REM***COMPUTATION SUBROUTINE
410 PRINT "YOU HAVE DECIDED TO USE ";C$;" UNITS.  PLEASE ENTER
        FORCE"
420 PRINT "IN ";B$;"S AND DISTANCE IN ";D$;"."
430 PRINT
440 PRINT "WHAT IS THE FORCE";
450 INPUT A
460 PRINT
470 PRINT "WHAT IS THE DISTANCE";
480 INPUT B
490 PRINT LIN(2)
500 PRINT "OK ";N$;", NOW I WANT YOU TO GIVE ME YOUR ANSWER
        USING THE"
510 PRINT "FORCE AND DISTANCE YOU JUST ENTERED AND THE FORMU
        LA I"
520 PRINT "GAVE YOU."
530 PRINT
540 INPUT C
550 PRINT
560 LET D=A*B
570 IF C<=D+.1 AND C>=D-.1 THEN 650
580 IF C$="ENGLISH" THEN 860
590 IF C$="METRIC" THEN 880
600 PRINT N$", YOU MADE AN ERROR, THE RIGHT ANSWER IS ";D;" ";
610 IF X=2 THEN 900
620 PRINT D$;"-";B$;"S."
630 PRINT "PLEASE RE-CHECK YOUR FIGURES ";N$;"."
640 GOTO 790
650 PRINT "ALL-RIGHT ";N$;" GOOD JOB!"
660 PRINT "YOU GOT THE RIGHT ANSWER."
670 GOTO 790
680 REM ***ENGLISH SUBROUTINE
690 LET B$="POUND"
700 LET C$="ENGLISH"
710 LET D$="FEET"
720 GOTO 400
```


85

```
730 REM ***METRIC SUBROUTINE
740 LET B$="NEWTON"
750 LET C$="METRIC"
760 LET D$="METRES"
770 GOTO 400
780 REM ***QUESTION-ANOTHER PROBLEM
790 PRINT LIN(2)
800 PRINT "DO YOU WANT TO TRY ANOTHER PROBLEM ";N$;
810 INPUT A$
820 IF A$="YES" THEN 270
830 IF A$="NO" THEN 930
840 PRINT "YOU MUST ANSWER YES OR NO."
850 GOTO 790
860 LET D$="FOOT"
870 GOTO 600
880 LET D$="METRE"
890 GOTO 600
900 LET D$="NEWTON"
910 LET B$="METRE"
920 GOTO 620
930 END
```

GRAPHIC COMMUNICATION

87

DRAFTING TEST

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Michael Garoutte
Linn-Mar Junior High School
Marion, Iowa

APPLICATIONS: Graphic Communication

INTRODUCTION: This test can be used in a beginning drafting course. The program listed is a sample of how a test can be written using HP BASIC. The type of questions used in this test consist of 1) true - false, 2) short answer, 3) fill in the blank, 4) multiple choice, 5) listing, 6) multi-answer and 7) the use of drawings on the computer. After each answer given by the student, the computer will respond with either ANSWER IS CORRECT or WRONG ANSWER. At the end the computer will give the number missed by the student, the number correct, the percentage and a decimal equivalent.

This test can be expanded by duplicating the steps for the type of question wanted and then adding those steps into the program.

THE PROGRAM:

```
 10 DIM N$[10],L$[15]
 15 PRINT TAB(29)"DRAFTING TEST"
 20 PRINT
 25 PRINT "PLEASE TYPE IN YOUR LAST NAME";
 30 INPUT L$
 35 PRINT "HELLO, MR. "L$", WHAT IS YOUR FIRST NAME";
 40 INPUT N$
 45 PRINT
 50 PRINT N$", IF YOU HAVE A PROBLEM WITH ANY QUESTIONS, CHECK"
 55 PRINT "WITH YOUR TEACHER."
 60 PRINT
 65 PRINT "RELAX AND GOOD LUCK, "N$"."
 70 PRINT
 75 PRINT
 80 C=0
 85 PRINT " 1. ANY PART OF AN OBJECT THAT SHOWS UP IN ONE VIEW,
        WILL SHOW"
 90 PRINT "     UP IN ALL THREE VIEWS."
 95 PRINT TAB(10)"TRUE"
100 PRINT TAB(10)"FALSE"
105 PRINT
110 PRINT " 1. ";
115 DIM A$[7]
120 INPUT A$
125 IF A$[1,1]="T" THEN 140
```

```
130 GOSUB 1180
135 GOTO 145
140 GOSUB 1190
145 PRINT
150 PRINT
155 PRINT " 2. IN ONE WORD, TELL WHAT THE MAIN DIFFERENCE IS
        BETWEEN"
160 PRINT "    A BORDER LINE AND AN OBJECT LINE."
165 PRINT
170 PRINT " 2. ";
175 DIM X$[10]
180 INPUT X$
185 IF X$[1,1]="T" THEN 205
190 IF X$[1,1]="W" THEN 205
195 GOSUB 1180
200 GOTO 210
205 GOSUB 1190
210 PRINT
215 PRINT
220 PRINT " 3. WHICH STATEMENT BEST DESCRIBES AN ISOMETRIC
        DRAWING?"
225 PRINT TAB(10)"(A) AN ORTHOGRAPHIC DRAWING"
230 PRINT TAB(10)"(B) A THREE VIEW DRAWING"
235 PRINT TAB(10)"(C) AN OBJECT IN PICTORIAL FORM"
240 PRINT TAB(10)"(D) NONE OF THE ABOVE"
245 PRINT
250 PRINT " 3. ";
255 DIM C1$[3]
260 INPUT C1$
265 IF C1$="C" THEN 280
270 GOSUB 1180
275 GOTO 285
280 GOSUB 1190
285 PRINT
290 PRINT
295 PRINT " 4. GIVE THE CORRECT NAME FOR EACH VIEW SHOWN BELO
        W. (TYPE IN"
300 PRINT TAB(5)"ONLY ONE ANSWER AFTER EACH QUESTION MARK)
        (3 POINTS)"
305 PRINT
310 PRINT TAB(11)"XXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
315 PRINT TAB(11)"X                            X"
320 PRINT TAB(11)"X              AAA           X"
325 PRINT TAB(11)"X             A   A          X"
330 PRINT TAB (11)"X            AAAAA          X"
335 PRINT TAB(11)"X             A   A          X"
340 PRINT TAB(11)"X             A   A          X"
345 PRINT TAB(11)"X                            X"
350 PRINT TAB(11)"XXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
355 PRINT
360 PRINT
```

```
365 PRINT
370 PRINT TAB(11)"XXXXXXXXXXXXXXXXXXXXXXXXX  XXXXXXXXXXXXXX"
375 PRINT TAB(11)"X                       X  X              X"
380 PRINT TAB(11)"X                       X  X              X"
385 PRINT TAB(11)"X          BBBB         X  X        CCC   X"
390 PRINT TAB(11)"X          B   B        X  X      C   C   X"
395 PRINT TAB(11)"X          BBBB         X  X      C       X"
400 PRINT TAB(11)"X          B   B        X  X      C   C   X"
405 PRINT TAB(11)"X          BBBB         X  X       CCC    X"
410 PRINT TAB(11)"X                       X  X              X"
415 PRINT TAB(11)"X                       X  X              X"
420 PRINT TAB(11)"XXXXXXXXXXXXXXXXXXXXXXXXX  XXXXXXXXXXXXXX"
425 PRINT
430 PRINT " 4. A. ";
435 DIM R$[10]
440 INPUT R$
445 IF R$[1,1]="T" THEN 460
450 GOSUB 1180
455 GOTO 465
460 GOSUB 1190
465 PRINT " 4. B. ";
470 DIM S$[10]
475 INPUT S$
480 IF S$[1,1]="F" THEN 495
485 GOSUB 1180
490 GOTO 500
495 GOSUB 1190
500 PRINT " 4. C. ";
505 DIM T$[12]
510 INPUT T$
515 IF T$[1,1]="S" THEN 535
520 IF T$[1,1]="R" THEN 535
525 GOSUB 1180
530 GOTO 540
535 GOSUB 1190
540 PRINT
685 PRINT
690 PRINT
695 PRINT "5. NAME FOUR PIECES OF EQUIPMENT THAT HAVE BEEN
      USED SO FAR."
700 PRINT TAB(5)"NO CREDIT FOR TAPE, PAPER OR PENCILS. (TYPE IN
      ONLY ONE"
705 PRINT TAB(5)"ANSWER AFTER EACH QUESTION MARK)  (4 POINTS)"
710 PRINT
715 PRINT " 5. A. ";
720 DIM B$[15],E$[15],I$[15],J$[15]
725 INPUT B$
730 IF B$="ERASING SHIELD" THEN 770
735 IF B$="DRAWING BOARD" THEN 770
740 IF B$="30-60 TRIANGLE" THEN 770
745 IF B$="45 TRIANGLE" THEN 770
750 IF B$="T-SQUARE" THEN 770
```


90

```
755 IF B$="SCALE" THEN 770
760 GOSUB 1180
765 GOTO 775
770 GOSUB 1190
775 PRINT "5. B. ";
780 INPUT E$
785 IF E$="ERASING SHIELD" THEN 825
790 IF E$="DRAWING BOARD" THEN 825
795 IF E$[1,1]="3" THEN 825
800 IF E$[1,1]="4" THEN 825
805 IF E$="T-SQUARE" THEN 825
810 IF E$="SCALE" THEN 825
815 GOSUB 1180
820 GOTO 835
825 IF E$=B$ THEN 815
830 GOSUB 1190
835 PRINT "5. C. ";
840 INPUT I$
845 IF I$="ERASING SHIELD" THEN 885
850 IF I$="DRAWING BOARD" THEN 885
855 IF I$[1,1]="3" THEN 885
860 IF I$[1,1]="4" THEN 885
865 IF I$="T-SQUARE" THEN 885
870 IF I$="SCALE" THEN 885
875 GOSUB 1180
880 GOTO 900
885 IF I$=B$ THEN 875
890 IF I$=E$ THEN 875
895 GOSUB 1190
900 PRINT "5. D. ";
905 INPUT J$
910 IF J$="ERASING SHIELD" THEN 950
915 IF J$="DRAWING BOARD" THEN 950
920 IF J$="T-SQUARE" THEN 950
925 IF J$="SCALE" THEN 950
930 IF J$[1,1]="3" THEN 950
935 IF J$=[1,1]="4" THEN 950
940 GOSUB 1180
945 GOTO 970
950 IF J$=B$ THEN 940
955 IF J$=E$ THEN 940
960 IF J$=I$ THEN 940
965 GOSUB 1190
970 PRINT
975 PRINT
1175 GOTO 1205
1180 PRINT "WRONG ANSWER"
1185 RETURN
1190 C=C+1
1195 PRINT "******** ANSWER IS CORRECT ********"
1200 RETURN
1205 PRINT
```

```
1210 PRINT
1215 PRINT
1220 T=10
1225 REM ***** T IS THE NUMBER OF POINTS ON THIS TEST
1230 B=C
1235 A=T-C
1240 D=B/T
1245 J=(INT(D*1000+.5)/1000)
1250 K=J*10
1255 E=J*100
1260 PRINT "##################################################################"
1265 PRINT
1270 PRINT TAB(3);L$", "N$" --- YOUR SCORE IS:"
1275 PRINT TAB(9)"NUMBER"TAB(24)"NUMBER"
1280 PRINT      TAB(9)"WRONG"TAB(24)"RIGHT"TAB(39)"PERCENT"TAB(55)
     "DECIMAL"
1285 PRINT TAB(9);A;TAB(24);B;TAB(39);E;TAB(55);K
1290 PRINT
1295 PRINT "##################################################################"
1300 PRINT
1305 PRINT "HAVE YOUR TEACHER TAKE A LOOK AT THIS SO YOU WILL
     GET CREDIT."
1310 END
```

SPACING

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Michael Garoutte
Linn-Mar Junior High School
Marion, Iowa

APPLICATIONS: Graphic Communication

INTRODUCTION: This program will figure spacing for decimal, metric or whole units. It could be used by the teacher to figure several spacing problems at once. It could also be used by a student to check spacing problems that have already been figured.

THE PROGRAM:

```
 10 DIM N$[15]
 20 DIM A$[10]
 30 DIM B$[10]
 40 DIM C$[10]
 50 PRINT "HELLO, I'M SUPER SPACER, WHAT IS YOUR NAME";
 60 INPUT N$
 70 PRINT "HI, ";N$;", THIS UNIT IS SET UP TO FIGURE YOUR SPACING"
 80 PRINT "FOR YOU.  ALL YOU NEED TO DO IS ANSWER THESE QUES
    TIONS."
 90 PRINT
100 PRINT "WHAT TYPE OF UNITS DO YOU WANT TO WORK WITH?"
110 PRINT
120 PRINT TAB(15)"1 DECIMAL"
130 PRINT TAB(15)"2 WHOLE UNITS"
140 PRINT TAB(15)"3 METRIC"
150 PRINT TAB(15)"4 I'M DONE FIGURING SPACING"
160 PRINT
170 PRINT "WHAT IS THE NUMBER OF YOUR CHOICE";
180 INPUT A
190 PRINT
200 PRINT
210 IF A=1 THEN 250
220 IF A=2 THEN 270
230 IF A=3 THEN 290
240 GOTO 1170
250 GOSUB 520
260 GOTO 310
270 GOSUB 580
280 GOTO 310
290 GOSUB 640
300 GOTO 310
```

```
310 PRINT "WHAT IS THE HEIGHT OF THE OBJECT, (FRONT AND SIDE
        VIEWS)";
320 INPUT B
330 PRINT "WHAT IS THE DEPTH OF THE OBJECT, (TOP AND SIDE
        VIEWS)";
340 INPUT C
350 PRINT "WHAT IS THE WIDTH OF THE OBJECT, (TOP AND FRONT
        VIEWS)";
360 INPUT D
370 PRINT "WHAT IS THE SPACE BETWEEN THE VIEWS";
380 INPUT E
390 PRINT
400 Z=B+C+E
410 W=D+C+E
420 Y=V-Z
430 X=H-W
440 M=Y/2
450 L=X/2
460 REM ###### Z, Y, V, AND M -- ALL DEAL WITH VERTICAL SPACING
470 REM ###### W, X, H, AND L -- ALL DEAL WITH HORIZONTAL SPACING
480 IF A=1 THEN 700
490 IF A=2 THEN 860
500 IF A=3 THEN 1020
510 PRINT
520 PRINT "USING DECIMALS, IF NECESSARY, TELL ME WHAT IS THE SIZE
        OF YOUR"
530 PRINT "WORKING SPACE....GIVE VERTICAL SPACE FIRST, FOLLOW IT
        WITH A COMMA,"
540 PRINT "THEN THE HORIZONTAL SPACE.  ** EXAMPLE: 9.5,11 **";
550 INPUT V,H
560 PRINT
570 RETURN
580 PRINT "USING WHOLE UNITS, TELL ME WHAT IS THE SIZE OF YOUR
        WORKING"
590 PRINT "SPACE....GIVE VERTICAL SPACE FIRST, FOLLOW IT WITH A
        COMMA, THEN"
600 PRINT "THE HORIZONTAL SPACE.  ** EXAMPLE:  10,24 **";
610 INPUT V,H
620 PRINT
630 RETURN
640 PRINT "USING METRIC MEASURE, IN mm, TELL ME WHAT IS THE SIZE
        OF YOUR"
650 PRINT "WORKING SPACE....GIVE VERTICAL SPACE FIRST, FOLLOW IT
        WITH A COMMA,"
660 PRINT "THEN THE HORIZONTAL SPACE.  ** EXAMPLE:  110,150 **";
670 INPUT V,H
680 PRINT
690 RETURN
700 PRINT TAB(10)"THE TOP & BOTTOM SPACING = "M" INCH."
710 PRINT TAB(10)"THE SIDE SPACING = "L" INCH."
720 PRINT
```

```
730 IF M<=0 THEN 760
740 IF L<=0 THEN 760
750 GOTO 780
760 PRINT
770 PRINT "USE EITHER A SMALLER SCALE OR A LARGER PAPER."
780 PRINT
790 PRINT "WOULD YOU LIKE TO GO AGAIN USING DECIMAL
        UNITS, ";N$
800 INPUT A$
810 PRINT
820 PRINT
830 IF A$[1,1]="Y" THEN 250
840 IF A$[1,1]="N" THEN 100
850 IF A$<>"N" THEN 1170
860 PRINT TAB(10)"THE TOP & BOTTOM SPACING = "M" UNITS."
870 PRINT TAB(10)"THE SIDE SPACING = "L" UNITS."
880 PRINT
890 IF M<=0 THEN 920
900 IF L<=0 THEN 920
910 GOTO 940
920 PRINT
930 PRINT "USE EITHER A SMALLER SCALE OR A LARGER PAPER."
940 PRINT
950 PRINT "MORE WHOLE UNIT WORK, ";N$;
960 INPUT B$
970 PRINT
980 PRINT
990 IF B$[1,1]="Y" THEN 270
1000 IF B$[1,1]="N" THEN 100
1010 IF B$<>"N" THEN 1170
1020 PRINT TAB(10)"THE TOP & BOTTOM SPACING = "M" mm."
1030 PRINT TAB(10)"THE SIDE SPACING = "L" mm."
1040 PRINT
1050 IF M<=0 THEN 1080
1060 IF L<=0 THEN 1080
1070 GOTO 1090
1080 PRINT "USE EITHER A SMALLER SCALE OR A LARGER PAPER."
1090 PRINT
1100 PRINT "ANOTHER METRIC PROBLEM, ";N$;
1110 INPUT C$
1120 PRINT
1130 PRINT
1140 IF C$[1,1]="Y" THEN 290
1150 IF C$[1,1]="N" THEN 100
1160 IF C$<>"N" THEN 1170
1170 PRINT
1180 PRINT
1190 PRINT "I'LL SEE YOU LATER, ";N$;", COME BACK WHEN YOU HAVE"
1200 PRINT "MORE SPACING PROBLEMS TO DO."
1210 END
```

MANUFACTURING

BASIC WOODWORKING TEST

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Don Foth
Plainfield Community School
Plainfield, Iowa

APPLICATIONS: Manufacturing

INTRODUCTION: This is a ten question basic woodworking test. It can be used for an introductory level course involving hand tools only. The format used in writing this program is very direct and can be expanded on or used as a format for programing other tests.

THE PROGRAM:

```
 10 REM ********* BASIC WOODWORKING TEST *********
 20 LET A=0
 30 LET B=0
 40 LET C=0
 50 LET D=0
 60 LET E=0
 70 LET F=0
 80 LET G=0
 90 LET H=0
100 LET I=0
110 LET J=0
120 PRINT"..... ...BASIC WOODWORKING TEST....."
130 PRINT
140 PRINT
150 PRINT
160 PRINT "ENTER THE NUMBER OF THE CORRECT RESPONSE FOR"
170 PRINT "EACH QUESTION."
180 PRINT
190 PRINT
200 PRINT
210 PRINT "1. SEASONED LUMBER IS LUMBER THAT IS"
220 PRINT
230 PRINT
240 PRINT "1. VERY OLD"
250 PRINT "2. DENTED AND SCRATCHED"
260 PRINT "3. DRIED BEFORE USE"
270 PRINT "4. DISCOLORED BY AGE"
280 INPUT X
290 IF X=3 THEN 310
300 LET A=1
310 PRINT
320 PRINT
330 PRINT "2. A JIG SAW IS PARTICULARLY USEFUL IN MAKING WHICH
        CUT?"
```

```
340 PRINT
350 PRINT "1. CROSSGRAIN"
360 PRINT "2. STRAIGHT"
370 PRINT "3. CURVED"
380 PRINT "4. ANGLE"
390 INPUT X
400 IF X=3 THEN 420
410 LET B=1
420 PRINT
430 PRINT
440 PRINT
450 PRINT "3. FOUR MAJOR STEPS IN PLANNING A PROJECT ARE LISTEL
        BELOW"
460 PRINT "ARRANGE THE STEPS IN ORDER FROM FIRST TO LAST."
470 PRINT
480 PRINT
490 PRINT "A CUTTING STOCK TO SIZE"
500 PRINT "B DESIGN THE PROJECT"
510 PRINT "C PLANNING THE PROCEDURE"
520 PRINT "D MAKING A WORKING DRAWING"
530 PRINT
540 PRINT "1. A,B,C,D"
550 PRINT "2. B,D,C,A"
560 PRINT "3. C,A,B,D"
570 PRINT "4. D,B,C,A"
580 INPUT X
590 IF X=2 THEN 610
600 LET C=1
610 PRINT
620 PRINT
630 PRINT"4. IN WHAT ORDER SHOULD LUMBER DIMENSIONS BE LISTED
        ON A "
640 PRINT "BILL OF MATERIALS?"
650 PRINT
660 PRINT
670 PRINT "1. LENGTH X WIDTH X THICKNESS"
680 PRINT "2. WIDTH X THICKNESS X LENGTH"
690 PRINT "3. THICKNESS X WIDTH X LENGTH"
700 PRINT "4. THICKNESS X LENGTH X WIDTH"
710 INPUT X
720 IF X=3 THEN 740
730 LET D=1
740 PRINT
750 PRINT
760 PRINT "5. THE WOOD USED TO LINE CHEST BECAUSE OF IT'S
        PLEASANT"
770 PRINT "AROMA AND AN ATTRACTIVE RED AND WHITE COLOR IS"
780 PRINT
790 PRINT
800 PRINT "1. PINE"
810 PRINT "2. CHERRY"
820 PRINT "3. WALNUT"
```

```
830 PRINT "4. CEDAR"
840 INPUT X
850 IF X=4 THEN 870
860 LET E=1
870 PRINT
880 PRINT
890 PRINT "6. WHEN APPLIED TO NAILS THE TERM PENNEY REFERS TO
      THE"
900 PRINT
910 PRINT
920 PRINT "1. MATERIAL FROM WHICH THE NAIL IS MADE"
930 PRINT "2. THICKNESS OF THE NAIL"
940 PRINT "3. HEAD SHAPE OF THE NAIL"
950 PRINT "4. LENGTH OF THE NAIL"
960 INPUT X
970 IF X=4 THEN 990
980 LET F=1
990 PRINT
1000 PRINT
1010 PRINT "7. WHICH LAYOUT TOOL LISTED BELOW IS THE BEST ONE TO"
1020 PRINT "USE TO DIVIDE AN 11 INCH BOARD INTO THREE EQUAL
      PARTS?"
1030 PRINT
1040 PRINT
1050 PRINT "1. BENCH RULE"
1060 PRINT "2. MARKING GAUGE"
1070 PRINT "3. TRY SQUARE"
1080 PRINT "4. T BEVEL"
1090 INPUT X
1100 IF X=1 THEN 1120
1110 LET G=1
1120 PRINT
1130 PRINT
1140 PRINT "8. WHICH OF THE TOOLS LISTED BELOW WOULD BE USED TO
      SMOOTH"
1150 PRINT "THE BOTTOM OF A DADO JOINT?"
1160 PRINT
1170 PRINT
1180 PRINT "1. FILE"
1190 PRINT "2. BLOCK PLANE"
1200 PRINT "3. JACK PLANE"
1210 PRINT "4. CHISEL"
1220 INPUT X
1230 IF X=4 THEN 1250
1240 LET H=1
1250 PRINT
1260 PRINT
1270 PRINT
1280 PRINT "9. WHICH OF THE FOLLOWING NUMBERS INDICATES THE
      MOST"
```

```
1290 PRINT "COARSE GRADE OF SANDPAPER?"
1300 PRINT
1310 PRINT
1320 PRINT "1. 160"
1330 PRINT "2. 120"
1340 PRINT "3. 100"
1350 PRINT "4. 60"
1360 INPUT X
1370 IF X=4 THEN 1390
1380 LET I=1
1390 PRINT
1400 PRINT
1410 PRINT "10. GENERALLY SPEAKING THE BEST LUMBER TO USE IN
          THE"
1420 PRINT "CONSTRUCTION OF FURNITURE IS"
1430 PRINT
1440 PRINT
1450 PRINT "1. AIR DRIED HARD BOARD"
1460 PRINT "2. AIR DRIED SOFTWOOD"
1470 PRINT "3. KILN DRIED SOFTWOOD"
1480 PRINT "4. KILN DRIED HARDWOOD"
1490 INPUT X
1500 IF S=4 THEN 1520
1510 LET J=1
1520 PRINT
1530 PRINT
1540 PRINT
1550 LET X=A+B+C+D+E+F+G+H+I+J
1560 LET X=100-10*X
1570 PRINT "YOUR PERCENTAGE RIGHT IS ";X
1580 END
```

BREAK-EVEN POINT

COMPUTER: Apple II

LANGUAGE: Applesoft

AUTHOR: Zeke Smolarek, UNI Grad. Student

APPLICATIONS: Manufacturing

INTRODUCTION: This program will plot a graph and print out (1) the number of units needed to be sold to break-even on a production run and (2) the amount of profit for a given number of units produced.

It should be used when students are preparing a manufacturing enterprise. They need to have the information described below in order to utilize the program.

On the average, a company works under these cost percentages: taxes 10%, rent 7%, wages and salaries 36%, production costs 25% and other costs 7%. This leaves about 7% for profit. Once the total product costs have been set, a break-even chart can be made.

The break-even point occurs when the company neither makes a profit nor loses money. The break-even point is found by following these steps:

1. Fixed costs include overhead, taxes, rent and general expense budget items. Fixed costs average 32% of the total costs. In our classroom we will use only a 5% average fixed cost factor.
2. Manufacturing cost per product are calculated by dividing material cost and labor by the number of products.
3. Sales income is figured on a per-product basis.
4. The break-even point is the point where manufacturing costs and sales income meet. The more units sold above this point the more profit earned by the company.
5. The total amount of money spent on wages, other costs and production costs is the fixed cost/unit. This is the point where manufacturing costs begin.

Reference: Iowa Industrial Arts Handbook for Introductory Level Production (Manufacturing and Construction) DPI, 1980 p. 478.

THE PROGRAM:

```
 1 REM **********************************
 2 REM * BREAK-EVEN POINT
 3 REM **********************************
 4 REM * PROGRAMMED BY ZEKE SMOLAREK
 5 REM **********************************
 6 REM * CALCULATES THE BREAK EVEN VOLUME
 7 REM * GIVEN THE COSTS AND PLOTS THE
 8 REM * COST RELATIONSHIP.
 9 REM **********************************
```

```
10 INPUT "SELLING PRICE/UNIT= ";SP
20 INPUT "VARIABLE COST/UNIT= ";VC
30 INPUT "FIXED COST IN TOTAL DOLLARS= ";FC
40 INPUT "EXPECTED VOLUME IN UNITS= ";EV
50 B=FC/(SP-VC)
51 REM **********************************
52 REM * DETERMINE THE Y SCALE
53 REM **********************************
60 J=EV/279
61 REM **********************************
62 REM * SET UP FOR GRAPHICS
63 REM **********************************
65 HGR
66 HCOLOR=7
67 HPLOT 0,0 to 279,0 to 279,159 to 0,159 to 0,0
70 FOR U=0 TO EV STEP J
80 Y=159-(159*SP*U)/(SP*EV)
85 HCOLOR=1
90 HPLOT U/J,Y
100 Y=159-(159*FC)/(SP*EV)
105 HCOLOR=5
110 HPLOT U/J,Y
120 Y=Y-(159*VC*U)/(SP*EV)
130 IF Y  0 THEN 140
132 PRINT "BREAK-EVEN CANNOT BE REACHED."
134 STOP
136 HCOLOR=6
140 HPLOT U/J,Y
150 NEXT U
160 PRINT "BREAK-EVEN POINT = ";B;" UNITS."
170 P=(SP*EV)-FC-(VC*EV)
180 PRINT " PROFIT AT ";EV;" UNITS = $";P
185 END
```

COMMON MACHINE SHOP FORMULAS

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Ronald L. Ainley
Hempstead High School
Dubuque, Iowa

APPLICATIONS: Manufacturing

INTRODUCTION: This program is designed for secondary and post-secondary machine tools classes. It consists of several formulas which are common to general machine shop practice. When using this program the student simply chooses the problem area in which they are working and supplies the necessary data.

The program can be used to find the following information:
Major diameter of number drills
Tap drill sizes
Sharp V thread depth
Cutting speeds
Spindle RPM
Shaper cutting speeds
Shaper strokes per minute
Taper per foot
Sine of angles

It can be used for problem-solving situations outside the classroom, for homework assignments, or to calculate information which relates to a lab exercise or student project. The instructor should encourage students to make mathematical calculations instead of estimating or guessing on machine tool information.

THE PROGRAM:

```
 10 PRINT TAB(5)"COMMON MACHINE SHOP FORMULAS"
 20 PRINT
 30 PRINT T$[10]
 40 PRINT "THIS IS A PROGRAM OF COMMON MACHINE SHOP FOR
        MULAS"
 50 PRINT
 60 PRINT
 70 PRINT "WHICH FORMULA DO YOU WISH TO USE?"
 80 PRINT TAB(5)"1. MAJOR DIAMETER OF NUMBER DRILLS"
 90 PRINT TAB(5)" 2. TAP DRILL SIZE"
100 PRINT TAB(5)"3. SHARP V THREAD DEPTH"
110 PRINT TAB(5)"4. CUTTING SPEEDS (FPM OR CS)"
120 PRINT TAB(5)"5. SPINDLE RPM"
130 PRINT TAB(5)"6. SHAPER CUTTING SPEED"
140 PRINT TAB(5)"7. SHAPER NUMBER OF STROKES PER MINUTE"
150 PRINT TAB(5)"8. TAPER PER FOOT"
160 PRINT TAB(5)"9. SINE OF ANGLE"
170 PRINT TAB(5)"10. STOP"
```

```
180 INPUT A
190 IF A >= 11 THEN 70
200 GOTO A OF 210,360,540,700,890,1050,1200,1360,1540,1770
210 REM *** MAJOR DIAMETER OF NUMBER SCREWS AND TAPS
220 PRINT "THIS FORMULA CALCULATES THE MAJOR DIAMETER OF
    NUMBER"
230 PRINT "SCREWS AND TAPS."
240 PRINT "WHAT SIZE NUMBER DRILL OR TAP ARE YOU USING?"
250 PRINT
260 INPUT A
270 LET B=(A*.013)+.06
280 PRINT B;" = MAJOR DIAMETER"
290 PRINT
300 PRINT "WANT ANYMORE MAJOR DIAMETER OF NUMBER SCREWS
    AND"
310 PRINT "TAPS INFORMATION?"
320 PRINT "ANSWER YES OR NO"
330 INPUT T$
340 IF T$[1,1]="Y" THEN 240
350 GOTO 70
360 REM *** TAP DRILL SIZE ***
370 PRINT "SUPPLY THE FOLLOWING INFORMATION IF YOU WANT TO
    FIND"
380 PRINT "THE CORRECT TAP DRILL DIAMETER."
390 PRINT "WHAT IS THE MAJOR DIAMETER OF YOUR TAP?"
400 INPUT C
410 PRINT "HOW MANY THREADS PER INCH IS YOUR TAP?"
420 PRINT
430 INPUT D
440 PRINT
450 LET E=C-(1/D)
460 PRINT
470 PRINT E;" = TAP DRILL SIZE"
480 PRINT
490 PRINT "DO YOU WANT TO FIND ANYMORE TAP DRILL DIAMETERS?"
500 PRINT "ANSWER YES OR NO"
510 INPUT T$
520 IF T$[1,1]="Y" THEN 370
530 GOTO 70
540 REM *** SHARP V THREAD DEPTH ***
550 PRINT "IF YOU WANT TO FIND THE THREAD DEPTH OF SHARP V"
560 PRINT "THREADS PLEASE SUPPLY THE FOLLOWING INFORMATION."
570 PRINT
580 PRINT "WHAT IS THE PITCH OF YOUR THREADS (NO. OF THREADS"
590 PRINT "PER INCH)?"
600 INPUT E
610 LET G=(1/F)*.866
620 PRINT
630 PRINT G;" = SHARP V THREADS"
640 PRINT
650 PRINT "DO YOU NEED TO KNOW ANYMORE SHARP V THREAD
    DEPTHS?"
```

```
660 PRINT "ANSWER YES OR NO"
670 INPUT T$
680 IF T$[1,1]="Y" THEN 580
690 GOTO 70
700 REM *** CUTTING SPEEDS ***
710 PRINT "IF YOU WISH TO FIND THE CORRECT CUTTING SPEED FOR
        LATHE,"
720 PRINT "DRILL PRESS OR MILLING MACHINE WORK YOU WILL NEED
        TO"
730 PRINT "SUPPLY THE FOLLOWING INFORMATION."
740 PRINT "WHAT IS THE DIAMETER OF YOUR WORKPIECE? IF FINDING"
750 PRINT "THE CS FOR A DRILL PRESS OR MILLING MACHINE, WHAT IS
        YOUR"
760 PRINT "DRILL OR MILL CUTTER DIAMETER?"
770 INPUT H
780 PRINT "AT WHAT RPM DO YOU WISH YOUR MACHINE TO OPERATE?"
790 INPUT I
800 LET J=H*I*3.14/12
810 PRINT
820 PRINT J;" = CUTTING SPEED"
830 PRINT
840 PRINT "DO YOU NEED ANYMORE CUTTING SPEEDS?"
850 PRINT "ANSWER YES OR NO"
860 INPUT T$
870 IF T$[1,1]="Y" THEN 740
880 GOTO 70
890 REM *** SPINDLE RPM ***
900 PRINT "TO CALCULATE THE CORRECT RPM YOUR MACHINE IS TO
        OPERATE."
910 PRINT "WHAT IS THE CS OR FPM FOR THE MATERIAL AND TOOLING"
920 PRINT "YOUR JOB REQUIRES?"
930 INPUT K
940 PRINT "WHAT IS THE DIAMETER OF YOUR WORKPIECE? IF USING A"
950 PRINT "DRILL PRESS OR MILLING MACHINE YOU MUST SUPPLY THE"
960 PRINT "DIA. OF YOUR DRILL OR CUTTER?"
970 INPUT L
980 LET M=K*4/L
990 PRINT M;" = SPINDLE RPM"
1000 PRINT "DO YOU WANT TO FIND ANYMORE SPINDLE RPM?"
1010 PRINT "ANSWER YES OR NO"
1020 INPUT T$
1030 IF T$[1,1]="Y" THEN910
1040 GOTO 70
1050 REM *** SHAPER CUTTING SPEED ***
1060 PRINT "WHEN USING A SHAPER, TO FIND THE CORRECT CUTTING
        SPEED"
1070 PRINT "YOU MUST SUPPLY THE FOLLOWING INFORMATION."
1080 PRINT "WHAT IS THE LENGTH OF STROKE YOUR SHAPER IS OPER
        ATING?"
1090 PRINT "AT ";N$;"?"
1100 INPUT N
1110 PRINT "HOW MANY STROKES PER MINUTE ARE YOU OPERATING
        YOUR SHAPER?"
```

```
1120 INPUT O
1130 LET P=N*O/7
1140 PRINT P;" = SHAPER CUTTING SPEED"
1150 PRINT "DO YOU WANT MORE SHAPER CUTTING SPEEDS?"
1160 PRINT "ANSWER YES OR NO"
1170 INPUT T$
1180 IF T$[1,1]="Y" THEN 1080
1190 GOTO 70
1200 REM *** SHAPER NUMBER OF STROKES PER MINUTE ***
1210 PRINT "BEFORE YOU SET YOUR SHAPER FOR THE CORRECT NUMBER
     OF"
1220 PRINT "STROKES PER MINUTE, CHECK THE CS CHART FOR THE
     CORRECT"
1230 PRINT "CUTTING SPEED OF THE MATERIAL YOU ARE SHAPING."
1240 PRINT "WHAT IS THE CS OF THE MATERIAL YOU ARE SHAPING?"
1250 INPUT Q
1260 PRINT "WHAT IS THE LENGTH OF YOUR STROKE?"
1270 INPUT R
1280 LET S=(Q*7)/R
1290 PRINT S;" = NUMBER OF SHAPER STROKES PER MINUTE"
1300 PRINT
1310 PRINT "DO YOU WANT ANYMORE SHAPER STROKES PER MINUTE
     INFORMATION?"
1320 PRINT "ANSWER YES OR NO"
1330 INPUT T$
1340 IF T$[1,1]="Y" THEN 1240
1350 GOTO 70
1360 REM *** TAPER PER FOOT ***
1370 PRINT " IN ORDER TO FIND THE TAPER PER FOOT USING THIS
     METHOD"
1380 PRINT "YOU NEED TO KNOW THE LARGER DIAMETER, SMALL
     DIAMETER,"
1390 PRINT "AND THE LENGTH OF THE TAPER. WHAT IS THE LARGE"
1400 PRINT "DIAMETER OF YOUR TAPER?"
1410 INPUT U
1420 PRINT "WHAT IS THE SMALL DIAMETER OF YOUR TAPER?"
1430 INPUT V
1440 PRINT "WHAT IS THE LENGTH OF YOUR TAPER?"
1450 INPUT W
1460 LET X=(U-V)/W*12
1470 PRINT X;" = TAPER PER FOOT"
1480 PRINT
1490 PRINT "DO YOU WANT TO SOLVE ANYMORE TAPER PER FOOT
     PROBLEMS?"
1500 PRINT "ANSWER YES OR NO"
1510 INPUT T$
1520 IF T$[1,1]="Y" THEN 1370
1530 GOTO 70
1540 REM *** SINE OF ANGLE ***
1550 PRINT "TO FIND THE SINE OF AN ANGLE YOU FIRST FIND THE
     DISTANCE"
```

```
1560 PRINT "FROM THE SURFACE PLATE TO THE BASE OF THE SINE BAR."
1570 PRINT "AFTER YOU FIND THIS DISTANCE GO TO A TABLE OF NATU
          RAL TRI-"
1580 PRINT "GONOMETRIC FUNCTIONS TO FIND THE ANGLE WHICH CORRE
          SPONDS"
1590 PRINT "WITH YOUR ANSWER."
1600 PRINT "WHAT IS THE DISTANCE FROM THE SURFACE PLATE TO THE
          BASE"
1610 PRINT "OF THE ELEVATED END OF YOUR SINE BAR?"
1620 INPUT Y
1630 PRINT "WHAT LENGTH SINE BAR ARE YOU USING?"
1640 INPUT Z
1650 PRINT
1660 LET A1=Y/Z
1670 PRINT A1;" SINE OF ANGLE"
1680 PRINT "TAKE THE SINE OF THE ANGLE YOU HAVE JUST FOUND"
1690 PRINT "AND FIND THE CORRESPONDING NUMBERS ON A"
1700 PRINT "TABLE OF NATURAL TRIGONOMETRIC FUNCTIONS.  THIS"
1710 PRINT "WILL GIVE YOU YOUR ANSWER TO THE NEAREST DEGREE
          AND MINUTE."
1720 PRINT "DO YOU WANT TO FIND MORE SINE OF ANGLES?"
1730 PRINT "ANSWER YES OR NO"
1740 INPUT T$
1750 IF T$[1,1]="Y" THEN 1600
1760 GOTO 70
1770 REM *** STOP ***
1780 PRINT
1790 END
```

COMPUTING ELECTRODE AMPERAGES FOR THE ELECTRIC WELDER

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Dale Amunson
Clarksville Community School
Clarksville, Iowa

APPLICATIONS: Manufacturing

INTRODUCTION: This program is designed to help the beginning welding student determine an approximate starting amperage for specific welding rod sizes. It will compute the amperage values for an electrode from the decimal equivalent of the fractional size of the electrode.

This is an approximate value only because amperage is a variable dependent upon a) electrode size, b) plate thickness, c) composition of the metal and d) rod flux composition.

This program could prove beneficial to beginning welding students who have a difficult time remembering the values or doing the mathematics to get them. After the welding students have some experience with amperage values and the welding results, they should not need to use this program.

Reference: Griffin, Ivan H. and Roden, Edward H. **WELDING PROCESSES**. Albany: Delmar Publishers, 1970.

THE PROGRAM:

```
 10 DIM A$(5)
 20 DIM N$(30)
 30 PRINT "WHAT IS YOUR NAME?  TYPE IT ON THE KEYBOARD THEN
        PRESS RETURN."
 40 PRINT
 50 INPUT N$
 60 PRINT
 70 PRINT "HELLO ";N$;", HOW ARE YOU?"
 80 PRINT
 90 PRINT TAB(5)"TO WELD SUCCESSFULLY, THE CORRECT AMPERAGE
        MUST BE USED."
100 PRINT
110 PRINT "YOUR STARTING AMPERAGE DEPENDS ON THE SIZE OF YOUR
        ELECTRODE"
120 PRINT
130 PRINT "AND THE THICKNESS OF THE MATERIAL.  AS A GENERAL
        RULE OF "
140 PRINT
150 PRINT "THUMB, THE AMPERAGE IS THE DECIMAL EQUIVALENT OF
        YOUR"
160 PRINT
170 PRINT " ELECTRODE SIZE."
180 REM PROBLEM
```

```
190 PRINT
200 PRINT TAB(5)"WHAT ELECTRODE SIZE ARE YOU USING, ";N$;"?"
210 PRINT
220 PRINT "TYPE THE FRACTION USING THIS EXAMPLE, 1/8 WOULD BE
      1,8."
230 PRINT
240 PRINT "AFTER TYPING IN THE NUMBERS AGAIN PRESS RETURN."
250 PRINT
260 INPUT N,D
270 PRINT
280 LET A=N/D*1000
290 PRINT "THE AMPERAGE IS ";A;" FOR ELECTRODE ";N;"/";D;"."
300 PRINT
310 PRINT TAB(5);"THIS IS ONLY A STARTING VALUE,  ";N$;"."
320 PRINT
330 PRINT "IT IS UP TO YOU TO ADJUST THE AMPERAGE FOR BEST
      PERFORMANCE."
340 PRINT
350 PRINT "IT MIGHT BE TOO HOT OR COLD FOR YOUR NEEDS."
360 PRINT
370 PRINT "DO YOU NEED ANY MORE AMPERAGE VALUES?  (YES OR NO)"
380 PRINT
390 INPUT A$
400 PRINT
410 IF A$(1,1)="Y" THEN 220
420 IF A$(1,1)="N" THEN 510
430 PRINT "YES OR NO, PLEASE!"
440 PRINT
450 GOTO 390
460 PRINT "THIS IS ONLY A STARTING VALUE, ";N$;"."
470 PRINT
480 PRINT "IT IS UP TO YOU TO ADJUST THE AMPERAGE FOR BEST
      PERFORMANCE."
490 PRINT
500 PRINT "IT MIGHT BE TOO HOT OR COLD FOR YOUR NEEDS."
510 PRINT
520 PRINT "GOOD LUCK, ";N$;"!"
530 END
```

EGGCRAFT CARRIER

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: William James
Williamsburg Community School
Williamsburg, Iowa

APPLICATIONS: Manufacturing

INTRODUCTION: The eggcraft carrier is a problem-solving activity. The student designs a device, within certain guidelines, to carry a raw egg. It must enable the egg to be dropped from a stated height and not be broken.

This program can be used to supplement the eggcraft activity by allowing the students to discover the speed of their eggcraft carrier, in feet/minute and miles/hour.

Reference: Iowa Industrial Arts Handbook for Introductory Level Production (Problem-Solving) DPI, 1980, p. 189.

THE PROGRAM:

```
 1 REM EGGCRAFT SPEED
 5 PRINT "                NA-NU          NA-NU
13 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
20 PRINT "THIS IS A PROGRAM TO TELL YOU THE SPEED OF YOUR EGG
       CRAFT."
22 PRINT : PRINT : PRINT : PRINT
30 PRINT "FOR ME TO FIGURE THE SPEED OF YOUR EGGCRAFT I WILL
       NEED TO KNOW THE DISTANCE IT DROPPED IN FEET."
35 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
40 PRINT " WHAT IS THE DISTANCE YOUR EGGCRAFT DROPPED = ?";
       : INPUT D
45 PRINT : PRINT : PRINT : PRINT : PRINT
50 INPUT "I ALSO NEED THE TIME IT TOOK TO DROP THIS DISTANCE, IN
       SECONDS. ";T
55 PRINT : PRINT : PRINT : PRINT : PRINT
70 LET X=D/T
75 PRINT : PRINT : PRINT : PRINT
79 PRINT "YOUR EGGCRAFT'S SPEED WAS ";X;" FEET PER SECOND."
80 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
81 PRINT "DO YOU WANT THAT IN MILES PER HOUR? (Y/N)": INPUT B$
82 IF B$="Y" THEN 84
83 GOTO 96
84 LET M=X/88
85 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
86 PRINT : PRINT : PRINT "YOUR EGGCRAFT TRAVELED";M" MILES PER
       HOUR.": PRINT
87 INPUT "DO YOU WANT ME TO FIGURE YOUR EGGCRAFT'S SPEED
       AGAIN?(Y OR N)";P$
88 IF P$="Y" THEN 20
```

```
 96 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
                PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT :
                PRINT
 97 PRINT "     IF YOUR EGGCRAFT DIDN'T WORK ALL I CAN SAY TO YOU
                IS THE YOKES ON YOU."
 98 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
100 END
```

LAND SPEED RECORD ASSAULT VEHICLE

--- SPEEDOMETER ---

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: William James
Williamsburg Community School
Williamsburg, Iowa

APPLICATION: Manufacturing

INTRODUCTION: The requirements of designing a Land Speed Record Assault Vehicle (LSRAV) is to study and identify design limitations. Students also become aware of constraints and variables that affect the design and speed of the vehicle. The student will then build and test a working model of an LSRAV.

This program will enrich the activity by allowing students to compute the speed (miles/hour and feet/second - kilo/hour and meters/second) of each individual vehicle.

Reference: Iowa Industrial Arts Handbook for Introductory Level Production (Problem-Solving) DPI, 1980, p. 195.

THE PROGRAM:

```
 10 PRINT TAB( 8)"LSRAV FINAL RACE RESULTS"
 15 PRINT : PRINT : PRINT : PRINT
 20 PRINT : PRINT : PRINT "WELCOME TO THE ELECTRONIC CONTROL
       CENTER FOR LSRAV RACE CAR DESIGNERS"
 40 PRINT : PRINT : PRINT TAB( 12)"WHAT IS YOUR NAME"
 50 INPUT N$
 60 PRINT : PRINT "IF YOU KNOW THE TIME IT TOOK YOUR CAR TO
       FINISH THE 50 FOOT DRAG STRIP, YOU CAN FIND OUT FOUR
       THINGS:"
 70 PRINT : PRINT TAB( 10)"THE SCALE SPEED IN MPH"
 80 PRINT : PRINT TAB( 10)"THE ACTUAL SPEED IN MPH"
 90 PRINT : PRINT TAB( 10)"THE SCALE SPEED IN KPH"
100 PRINT : PRINT TAB( 10)"THE ACTUAL SPEED IN KPH"
110 PRINT : PRINT : PRINT "TYPE IN YOUR CAR'S TIME IN SECONDS-";
       INPUT T
120 IF T=1 THEN 400
130 V=814.25/T
135 V1=(INT (V*100+.5)/100)
140 K=V*1.609
145 K1=(INT (V*100+.5)/100)
150 S1=V/12
155 S=(INT (V*100+.5)/100)
160 K3=3*1.609
165 K2=(INT (V*100+.5)/100)
```

```
166 PRINT : PRINT : PRINT : PRINT : PRINT TAB( 10)N$
170 PRINT : PRINT : PRINT : PRINT : PRINT "THE SCALE SPEED OF YOUR
        CAR-";V1;" MPH"
180 PRINT : PRINT "THE ACTUAL SPEED OF YOUR CAR-";S;" MPH"
190 PRINT : PRINT "THE SCALE SPEED OF YOUR CAR-";K1;" KPH"
200 PRINT : PRINT "THE SCALE SPEED OF YOUR CAR-";K2;" KPH"
210 PRINT : PRINT : PRINT "PLEASE LET THE NEXT DRIVER ENTER THEIR
        RESULTS."
215 PRINT : PRINT : PRINT "     PRESS THE RETURN"
220 INPUT I$
230 GOTO 15
400 END
```

LOAN AND INTEREST COST ANALYSIS

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHORS: John Poock
Tripoli High School
Tripoli, Iowa

Revised by: Don Foth
Plainfield Community School
Plainfield, Iowa

APPLICATIONS: Manufacturing

INTRODUCTION: Industry is constantly borrowing and repaying money to keep things running. The cost of a loan must be figured when running an enterprise. This program will set up any loan situation and figure the cost of a loan.

THE PROGRAM:

```
 10 PRINT "THIS IS A PROGRAM TO SHOW THE TOTAL COST OF A LOAN."
 20 PRINT
 30 PRINT
 40 PRINT "THE INTEREST CAN BE CALCULATED MONTHYLY BY
        KNOWING"
 50 PRINT "THE PRINCIPAL OR AMOUNT OF MONEY TO BE BORROWED,"
 60 PRINT "THE RATE OF INTEREST AND THE LENGTH OF TIME YOU"
 70 PRINT "WANT TO TAKE TO PAY BACK THE LOAN."
 80 PRINT
 90 PRINT
100 PRINT "AMOUNT BORROWED OR PRINCIPAL (DECIMAL FORM, NO
        COMMA)"
110 INPUT P
120 PRINT
130 PRINT
140 PRINT "ANNUAL INTEREST RATE"
150 INPUT I
160 LET I=I/100
170 PRINT "NUMBER OF MONTHS TO REPAY THE LOAN"
180 INPUT M
190 PRINT
200 PRINT
210 LET T=P*I*(M/12)
220 LET Z=(P+T)/M
230 LET X=T/M
240 PRINT
250 PRINT "YOU WILL PAY ";Z;" DOLLARS EACH MONTH FOR THE NE
        XT ";M;" MONTHS"
260 PRINT "TO REPAY THIS LOAN."
270 PRINT
280 PRINT "THE AMOUNT OF INTEREST YOU ARE PAYING EACH MONTH
        IS $";X
```

```
290 PRINT
300 PRINT "AT THE END OF ";M/12;" YEARS YOU WILL HAVE PAID
        $";T+P
310 PRINT "TO COVER YOUR ORIGINAL LOAN OF $";P
320 PRINT "THE TOTAL COST OF YOUR LOAN IS $";I;"."
330 PRINT
340 PRINT "DO YOU WANT TO RUN THIS PROGRAM AGAIN? (Y OR N)"
350 PRINT
360 DIM C$[12]
370 INPUT C$
380 IF C$="YES" THEN90
390 IF C$="Y" THEN90
400 PRINT "I HOPE YOU HAD AN INTERESTING DAY!!"
410 END
```

RPM AND STROKES PER MINUTE

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Ronald L. Ainley
Hampstead High School
Dubuque, Iowa

APPLICATION: Manufacturing

INTRODUCTION: This program is designed for application in secondary and post secondary machine shop courses. It can be used with any type of lathe, drilling machine, milling machine or shaper.

The RPM and cutting strokes per minute of a machine are directly related to the cutting speed. There are several variables which must be considered when calculating the cutting speed. These include:

The type of material
The type of tooling
The use of coolant
The depth of the cut

The student supplies the above information to the computer to find the correct RPM. If a milling machine cutter RPM is being calculated, the student can also use the program to find the following:

Feed per tooth of the cutter
Feed in inches per minute of the cutter

When using the shaper, the student uses the CS to find the correct number of strokes per minute to operate the shaper.

The data compiled in this program will give the user an estimated RPM or number of strokes per minute to operate their machine. The horsepower and condition of the machine, type of setup, shape of the workpiece and rate of feed are also critical variables in determining the RPM or strokes per minute.

THE PROGRAM:

```
 10 DIM T$[5],X$[12]
 20 PRINT TAB(5)"RPM OR STROKES PER MINUTE"
 30 PRINT
 40 PRINT "IF YOU WANT TO KNOW THE CORRECT RPM OR STROKES PER
    MINUTE"
 50 PRINT "TO OPERATE YOUR MACHINE SUPPLY THE REQUIRED INFOR-
    MATION."
 60 PRINT "WHAT TYPE OF MACHINE ARE YOU OPERATING TODAY?"
 70 PRINT TAB(5)"1. LATHE"
 80 PRINT TAB(5)"2. DRILLING MACHINE"
 90 PRINT TAB(5)"3. MILLING MACHINE"
100 PRINT TAB(5)"4. SHAPER"
110 PRINT TAB(5)"5. STOP"
120 INPUT A
```

```
130 IF A>5 THEN 40
140 IF A=5 THEN 1360
150 PRINT "USE THE FOLLOWING CUTTING SPEED CHART TO DETERMINE
    THE CS"
160 PRINT "OF FPM FOR THE MATERIAL YOU ARE MACHINING.  IF THE
    MATERIAL"
170 PRINT "WHICH YOU ARE USING IS NOT LISTED CHOOSE A MATERIAL
    WHICH"
180 PRINT "HAS PROPERTIES WHICH RELATE TO THE MATERIAL BEING
    MACHINED"
190 PRINT "ON THIS JOB.  TYPE IN THE CUTTING SPEED LISTED BEHIND
    THE"
200 PRINT "MATERIAL."
210 PRINT TAB(5)"   MATERIAL                          CUTTING SPEED"
220 PRINT TAB(5)"FREE MACHINING STEEL                 200"
230 PRINT TAB(5)"LOW CARBON STEEL                     95"
240 PRINT TAB(5)"MEDIUM CARBON STEEL                  75"
250 PRINT TAB(5)"HIGH CARBON STEEL                    55"
260 PRINT TAB(5)"TOOL STEEL                           60"
270 PRINT TAB(5)"STAINLESS STEEL                      35"
280 PRINT TAB(5)"GRAY CAST IRON                       100"
290 PRINT TAB(5)"HARD CAST IRON                       40"
300 PRINT TAB(5)"ALUMINUM                             200"
310 PRINT TAB(5)"BRASS                                250"
320 PRINT TAB(5)"BRONZE                               150"
330 PRINT TAB(5)"MOLDED PLASTIC                       220"
340 PRINT TAB(5)"ACRYLIC PLASTIC                      65"
350 PRINT TAB(5)"FIBER                                125"
360 PRINT TAB(5)"WOOD                                 350"
370 INPUT B
380 PRINT "WHAT TYPE OF TOOLING ARE YOU USING ON THIS JOB?"
390 PRINT TAB(5)"1.  HIGH SPEED STEEL"
400 PRINT TAB(5)"2.  CARBIDE"
410 PRINT TAB(5)"3.  CERAMIC"
420 INPUT C
430 IF C>=4 THEN 380
440 GOTO C OF 450,460,470
450 LET C=B
460 LET C=B+(.5*B)
470 LET C=B+(.6*B)
480 PRINT"ARE YOU USING COOLANT ON THIS JOB?"
490 PRINT "ANSWER YES OR NO"
500 INPUT T$
510 IF T$[1,1]="Y" THEN 540
520 PRINT
530 GOTO 550
540 LET C=C+(C*.3)
550 PRINT "ARE YOU TAKING A ROUGHING OR FINISHING CUT?"
560 PRINT "ANSWER ROUGHING OR FINISHING"
570 INPUT X$
580 IF X$[1,1]="F" THEN 600
590 PRINT
```

```
600 LET C=C+(C*.25)
610 IF A=1 THEN 630
620 IF A=2 THEN 680
630 IF A=3 THEN 780
640 IF A=4 THEN 1250
650 PRINT "WHAT IS THE DIAMETER OF YOUR WORKPIECE?"
660 INPUT F
670 GOTO 700
680 PRINT "WHAT IS THE DIAMETER OF YOUR DRILL?"
690 INPUT F
700 LET G=F*C*3.14/12
710 PRINT G;" = YOUR CORRECT SPINDLE SPEED"
720 PRINT "DO YOU WANT ANYMORE SPINDLE RPM INFORMATION?"
730 PRINT "ANSWER YES OR NO"
740 INPUT T$
750 PRINT
760 IF T$[1,1]="Y" THEN 150
770 GOTO 50
780 PRINT "WHAT IS THE DIAMETER OF YOUR MILL CUTTER?"
790 INPUT H
800 LET G1=(C*12)/(H*3.14)
810 PRINT G1;" = MILL CUTTER RPM"
820 PRINT
830 PRINT "DO YOU WANT TO FIND THE FEED PER TOOTH OF YOUR
        CUTTER?"
840 PRINT "ANSWER YES OR NO"
850 INPUT T$
860 IF T$[1,1]="Y" THEN 880
870 GOTO 1010
880 PRINT "HOW MANY TEETH ARE ON YOUR CUTTER?"
890 INPUT I
900 PRINT "WHAT RPM IS YOUR MILL OPERATING?"
910 INPUT J
920 LET K=I/J
930 PRINT K;" = FEED PER TOOTH"
940 PRINT
950 PRINT "WANT ANYMORE FEED PER TOOTH INFORMATION?"
960 PRINT "ANSWER YES OR NO"
970 INPUT T$
980 IF T$[1,1]="Y" THEN 880
990 PRINT
1000 GOTO 1010
1010 PRINT "DO YOU WANT YOUR CUTTER FEED IN INCHES PER MINUTE?"
1020 PRINT "ANSWER YES OR NO"
1030 INPUT T$
1040 IF T$[1,1]="Y" THEN 1070
1050 PRINT
1060 GOTO 60
1070 PRINT "TO FIND THE FEED IN INCHES PER REVOLUTION REFER TO A
        FEED"
1080 PRINT "CHART FOR MILL CUTTERS. MOST MACHINE TOOL TEXT
        OR A"
```

```
1090 PRINT "MACHINISTS READY REFERENCE GUIDE WILL HAVE THIS IN
     FORMATION"
1100 PRINT "IN FEED IN INCHES PER MINUTE."
1110 PRINT "WHAT IS YOUR CUTTING SPEED FOR THIS JOB?"
1120 INPUT C
1130 PRINT "WHAT RPM IS YOUR MILLING MACHINE OPERATING?"
1140 INPUT M
1150 LET N=C*M
1160 PRINT
1170 PRINT N;" = FEED IN INCHES PER MINUTE"
1180 PRINT
1190 PRINT "WANT TO FIND ANYMORE FEED IN INCHES PER MINUTE?"
1200 PRINT "ANSWER YES OR NO"
1210 INPUT T$
1220 IF T$[1,1]="Y" THEN 1150
1230 PRINT
1240 GOTO 60
1250 PRINT "WHAT IS THE LENGTH OF YOUR STROKE?"
1260 INPUT P
1270 LET Q=C*7/P
1280 PRINT Q;" = THE NUMBER OF STROKES PER MINUTE"
1290 PRINT
1300 PRINT "DO YOU WANT ANYMORE STROKES PER MINUTE CALCULA
     TIONS?"
1310 PRINT "ANSWER YES OR NO"
1320 INPUT T$
1330 IF T$[1,1]="Y" THEN 150
1340 PRINT
1350 GOTO 40
1360 END
```

SHEET METAL PROJECT COSTS

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Dale Amunson
Clarksville Community School
Clarksville, Iowa

APPLICATION: Manufacturing

INTRODUCTION: This program is to be used by the student to compute the cost of sheet metal to be used in projects. The program will figure the cost of each gauge of metal in a project and then at the end will give a total cost of the complete project. For students designing projects this can be beneficial in that they can get a cost for the project before they start. It can be adapted to compute the cost of anything sold by the square foot.

Before the students run the program they should have the following information: size of each sheet in inches, its gauge number and the cost of each gauge number per square foot. From this information the program will compute the total cost of the project.

THE PROGRAM:

```
 10 T1=0
 20 S1=0
 30 DIM M$(5)
 40 DIM B$(5)
 50 REM A PROGRAM TO COMPUTE THE COSTS OF SHEET METAL
      PROJECTS.
 60 PRINT TAB(5)"THIS PROGRAM COMPUTES THE COSTS OF YOUR "
 70 PRINT
 80 PRINT "SHEET METAL PROJECTS."
 90 PRINT
100 PRINT "TO COMPUTE THE COST OF YOUR PROJECT YOU WILL NEED
      TO KNOW THE"
110 PRINT
120 PRINT "TYPE OF METAL, THE GAUGE, AND THE SIZE OF ALL THE
      SHEETS."
130 PRINT
140 PRINT "THE METALS THAT ARE USED ARE ALL PRICED BY THE
      SQUARE FOOT, SO"
150 PRINT
160 PRINT "THE SQUARE FOOTAGE MUST FIRST BE DETERMINED."
170 PRINT
180 PRINT "DO YOU HAVE MORE THAN ONE GAUGE OF METAL? YES OR
      NO.  ";
190 INPUT D$
200 PRINT
```

```
210 IF D$(1,1)="Y" THEN260
220 IF D$(1,1)="N" THEN 280
230 PRINT
240 PRINT "YES OR NO, PLEASE!"
250 GOTO 190
260 PRINT "COMPUTE ONE GAUGE OF METAL AT A TIME."
270 PRINT
280 PRINT "WHAT GAUGE ARE YOU COMPUTING NOW?  ";
290 INPUT G
300 PRINT
310 PRINT "GIVE THE DIMENSIONS OF YOUR SHEET IN INCHES, EXAMPLE
        6IN. x 6IN. ="
320 PRINT
330 PRINT "6,6.      ";
340 INPUT L,W
350 PRINT
360 S=L*W
370 S1=S1+S
380 PRINT "ANYMORE? YES OR NO.  ";
400 INPUT D$
410 PRINT
420 IF D$(1,1)="Y" THEN 310
430 PRINT "THE TOTAL SQUARE FEET OF ";G;" GAUGE IS ";S1/144
440 PRINT
450 PRINT "NOW THAT WE HAVE THE NUMBER OF SQUARE FEET WE
        CAN COMPUTE THE"
460 PRINT
470 PRINT "COST OF YOUR SHEETS."
480 PRINT
490 PRINT "WHAT IS THE COST PER SQUARE FOOT OF ";G;" GAUGE?  "
495 PRINT
500 PRINT "TYPE IT IN FROM THE EXAMPLE $ .34 = 0.34    ";
510 INPUT C
520 PRINT
530 C1=C*S1/144
540 PRINT "THE TOTAL COST OF THE ";G;" GAUGE IS ";
550 PRINT USING 560;C1
560 IMAGE 3D.2D
570 PRINT
580 PRINT "WRITE DOWN THIS FIGURE IF YOU NEED IT."
590 PRINT
600 PRINT "IS THERE ANOTHER GAUGE? YES OR NO.  ";
610 INPUT M$
620 T1=T1+C1
630 PRINT
640 S1=0
650 IF M$(1,1)="Y" THEN 280
660 IF M$(1,1)="N" THEN 690
670 PRINT
680 PRINT "YES OR NO, PLEASE!"
690 PRINT "THE TOTAL COST OF THIS PROJECT IS  ";
```

```
700 PRINT USING 710;T1
710 IMAGE 3D.2D
720 PRINT
730 PRINT "THESE FIGURES SHOULD BE DOUBLE CHECKED FOR
      ACCURACY."
740 PRINT
750 PRINT "THANK YOU!"
760 END
```

INSTRUCTIONAL MANAGEMENT

GRADE CALCULATOR

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Scott Figg
J. B. Young Junior High School
1709 Harrison
Davenport, Iowa

APPLICATION: Instructional Management

INTRODUCTION: This program saves the teacher time in calculating grades on papers, test, quizzes, etc. The teacher must enter:

1) Total number of students
2) Student name and/or number
3) Student score
4) Maximum possible score
5) Percent cut-off for each grade

The computer will print a frequency distribution chart and an output chart containing the students name and/or numbers, raw score, percentage and letter grade. This program will also store student names and/or numbers for future use with different scores.

THE PROGRAM:

```
 10 FILES *,*,*
 20 DIM N$[40]
 30 DIM A$[10]
 40 DIM B$[10]
 50 DIM D$[10]
 60 DIM C$[10]
 70 PRINT
 80 PRINT "DO YOU NEED DIRECTIONS FOR THIS PROGRAM";
 90 INPUT D$
100 IF D$="YES" THEN 140
110 IF D$="NO" THEN 280
120 PRINT "YOU MUST ANSWER YES OR NO."
130 GOTO 80
140 REM *** INFORMATION AND DIRECTIONS
150 PRINT LIN(2)
160 PRINT "THIS IS A PROGRAM THAT WILL HELP YOU CALCULATE
      GRADES ON"
170 PRINT "PAPERS, TESTS, QUIZZES, ETC.  THIS PROGRAM REQUIRES
      SEVERAL"
180 PRINT "ITEMS OF INPUT AND IN TURN PRINTS TWO CHARTS.  ONE
      CHART"
190 PRINT "IS A FREQUENCY DISTRIBUTION CHART.  THE OTHER CHART"
200 PRINT "CONTAINS STUDENT NAME AND/OR NUMBER, PERCENT,
      SCORE,"
```

```
210 PRINT "AND LETTER GRADE.  THE INPUTS THAT YOU WILL BE RE
      QUIRED"
220 PRINT "TO GIVE ARE:"
230 PRINT TAB(15);"1.  STUDENT NAME AND/OR NUMBER"
240 PRINT TAB(15);"2.  STUDENT SCORE"
250 PRINT TAB(15);"3.  TOTAL NUMBER OF STUDENTS"
260 PRINT TAB(15);"4.  MAXIMUM POSSIBLE SCORE"
270 PRINT TAB(15);"5.  PERCENT CUT-OFF FOR EACH GRADE"
280 PRINT LIN(2)
290 PRINT "ARE STUDENTS NAMES ALREADY ON COMPUTER FIL' FOR
      THIS PROGRAM";
300 INPUT C$
310 PRINT LIN(2)
320 IF C$="YES" THEN 1560
330 IF C$="NO" THEN 360
340 PRINT "YOU MUST ANSWER YES OR NO."
350 GOTO 290
360 CREATE R9,"ZZAA",4
370 ASSIGN "ZZAA",1,R9
380 CREATE R9,"ZZAB",1
390 ASSIGN "ZZAB",2,R9
400 CREATE R9,"ZZAC",1
410 ASSIGN "ZZAC",3,R9
420 PRINT "HOW MANY STUDENTS ARE YOU GOING TO ENTER";
430 INPUT N
440 PRINT #3;N
450 PRINT LIN(3)
460 REM *** STUDENT NAME AND SCORE INPUT
470 FOR Z=1 TO N
480 PRINT "WHAT IS THE STUDENTS NAME AND/OR NUMBER";
490 INPUT N$
500 PRINT #1;N$
510 PRINT "WHAT IS THE STUDENTS SCORE";
520 INPUT S
530 PRINT #2;S
540 PRINT LIN(2)
550 NEXT Z
560 PRINT LIN(2)
570 REM *** MAXIMUM SCORE INPUT
580 PRINT LIN(2)
590 PRINT "WHAT IS THE MAXIMUM POSSIBLE SCORE";
600 INPUT M
610 PRINT LIN(2)
620 PRINT "WOULD YOU LIKE TO SEE A FREQUENCY CHART";
630 INPUT D$
640 IF D$="NO" THEN 810
650 PRINT LIN(6)
660 REM *** TABLE #1 PRINTOUT AND TABULATION
670 PRINT TAB(11);"RAW";TAB(22);"NUMBER"
680 PRINT TAB(11);"SCORE";TAB(22);"OF SCORES";TAB(35);"PERCENT"
690 FOR Y=M TO 1 STEP -1
700 PRINT TAB(12);Y;
```

```
710 LET O=0
720 READ #2,1
730 FOR W=N TO 1 STEP -1
740 READ #2;R
750 IF R=Y THEN 1540
760 NEXT W
770 PRINT TAB(25);O;
780 PRINT USING 790;(Y/M)*100
790 IMAGE 5XDDD.D
800 NEXT Y
810 PRINT LIN(6)
820 REM *** GRADE PERCENT INPUT
830 PRINT "AT WHAT PERCENT DO YOU WANT EACH GRADE TO BE CUT-
        OFF?"
840 PRINT
850 PRINT "NOTE *** ENTER JUST A NUMBER DO NOT HIT THE % KEY."
860 PRINT "NOTE *** IF YOU WISH TO SKIP A GRADE, ENTER 100."
870 PRINT LIN(2)
880 PRINT TAB(15);"A=";
890 INPUT A
900 PRINT TAB(15);"A-=";
910 INPUT A2
920 PRINT TAB(15);"B+=";
930 INPUT B1
940 PRINT TAB(15);"B=";
950 INPUT B
960 PRINT TAB(15);B-=";
970 INPUT B2
980 PRINT TAB(15);"C+=";
990 INPUT C1
1000 PRINT TAB(15);"C=";
1010 INPUT C
1020 PRINT TAB(15);"C-=";
1030 INPUT C2
1040 PRINT TAB(15);"D+=";
1050 INPUT D1
1060 PRINT TAB(15);"D=";
1070 INPUT D
1080 PRINT TAB(15);"D-=";
1090 INPUT D2
1100 PRINT LIN(8)
1110 REM *** TABLE #2 PRINTOUT AND TABULATION
1120 PRINT TAB(8);"NAME";TAB(22);"SCORE";TAB(35);"PERCENT";
1130 PRINT TAB(49);"GRADE"
1140 READ #1,1
1150 READ #2,1
1160 FOR U=N TO 1 STEP -1
1170 READ #1;N$
1180 PRINT TAB(8);N$;
1190 READ #2;S
1200 PRINT TAB(23);S;
1210 LET T=(S/M)*100
```

```
1220 PRINT USING "#,6X3D.D";T
1230 IF T>=A THEN 1750
1240 IF T>=A2 THEN 1770
1250 IF T>=B1 THEN 1790
1260 IF T>=B THEN 1810
1270 IF T>=B2 THEN 1830
1280 IF T>=C1 THEN 2080
1290 IF T>=C THEN 1870
1300 IF T>=C2 THEN 1890
1310 IF T>=D1 THEN 1910
1320 IF T>=D THEN 1930
1330 IF T>=D2 THEN 1950
1340 GOTO 1970
1350 NEXT U
1360 PRINT LIN(8)
1370 PRINT "DO YOU WISH TO RETAIN THI  STUDENT'S NAMES ON FILE?"
1380 PRINT
1390 PRINT "NOTE*****IF YOU ARE GOING  O RUN THIS PROGRAM AGAIN
          WITH"
1400 PRINT "THE SAME STUDENTS ANSWE  YES."
1410 INPUT B$
1420 IF B$="YES" THEN 1460
1430 IF B$="NO" THEN 1990
1440 PRINT "YOU MUST ANSWER YES OR N
1450 GOTO 1370
1460 PRINT LIN(2)
1470 PRINT "DO YOU WISH TO RUN THIS PR  RAM AGAIN";
1480 INPUT A$
1490 PRINT LIN(2)
1500 IF A$="YES" THEN 10
1510 IF A$="NO" THEN 2080
1520 PRINT "YOU MUST ANSWER YES OR N
1530 GOTO 1470
1540 LET O=O+1
1550 GOTO 760
1560 REM *** SAME STUDENT SUBROUTINE
1570 ASSIGN "ZZAA",1,R9
1580 ASSIGN "ZZAB",2,R9
1590 ASSIGN "ZZAC",3,R9
1600 READ #1,1
1610 READ #2,1
1620 READ #3,1
1630 READ #3;N
1640 FOR D=1 TO N
1650 READ #1;N$
1660 PRINT "WHAT IS ";N$;" 'S SCORE";
1670 INPUT S
1680 PRINT #2;S
1690 NEXT D
1700 GOTO 570
1710 REM *** TABLE #1 SUBROUTINE
1720 LET O=O+1
```

```
1730 GOTO 760
1740 REM***TABLE #2 GRADE PRINTOUT
1750 PRINT TAB(51);"A"
1760 GOTO 1350
1770 PRINT TAB(51);"A-"
1780 GOTO 1350
1790 PRINT TAB(51);"B+"
1800 GOTO 1350
1810 PRINT TAB(51);"B"
1820 GOTO 1350
1830 PRINT TAB(51);"B-"
1840 GOTO 1350
1850 PRINT TAB(51);"C+"
1860 GOTO 1350
1870 PRINT TAB(51);"C"
1880 GOTO 1350
1890 PRINT TAB(51);"C-"
1900 GOTO 1350
1910 PRINT TAB(51);"D+"
1920 GOTO 1350
1930 PRINT TAB(51);"D"
1940 GOTO 1350
1950 PRINT TAB(51);"D-"
1960 GOTO 1350
1970 PRINT TAB (51);"*F*"
1980 GOTO 1350
1990 REM *** FILE PURGE SUBROUTINE
2000 ASSIGN *,2
2010 PURGE R9,"ZZAB"
2020 ASSIGN *,1
2030 PURGE R9,"ZZAA"
2040 ASSIGN *,3
2050 PRUGE R9,"ZZAC"
2060 IF A$="NO" THEN 2080
2070 IF B$="NO" THEN 1460
2080 END
```

INDUSTRIAL ARTS
ACCOUNTS PAYABLE

COMPUTER: Ohio Scientific Instrument; Informer; (Use disk drive)

LANGUAGE: Microsoft BASIC; Informer BASIC

AUTHOR: John Lyman
Kennedy High School
Cedar Rapids, Iowa

APPLICATION: Instructional Management

INTRODUCTION: An account file of this type is used for keeping track of supply accounts in a shop facility. Invoice #, date of invoice, amount of invoice as well as check #, date of payment, and amount of payment are kept on file. A balance of each account is made after reading the file. By entering each invoice and check number and amounts as they are received, monthly billing can be checked easily.

To initialize the program, run "Hold-2" (OSI) for each file you will have. The program will need slight modifications to adapt to your own suppliers.

Sample:

```
RUN
          *** AUTO DEPT. ACC'T PAYABLE ***

SUPPLIER'S NAME & ACC'T NO. ARE LISTED BELOW

SELECT THE ACCOUNT BY NO.---

    1. ALLEN MOTOR CO.
    2. CARL ANDERSON
    3. BARRON MOTOR SUPPLY
    4. CHUCK SMITH DIST.
    5. SEGER
? 4
CSD
TO READ ACC'T (R) ** TO WRITE ACC'T (W)
? R
```

E	INVOICE/CK#	DATE	DEBIT	CREDIT	BAL
1	BAL-FWD	2/29/80	268.59		
2	14359	3/05/80	35.80		
3	20412	3/12/80	19.06		
4	20426	3/14/80	13.45		
5	2156	3/ 7/80		268.58	
6	20451	3/17/80	42.58		
7	20464	3/19/80	3.76		
8	20521	3/26/80	52.79		
9	20534	3/28/80	37.54		

THE PROGRAM:

```
 10 REM PROGRAM FOR SUPPLIERS ACCOUNTS-AUTO
 15 PRINT"          *** AUTO DEPT. ACC'T PAYABLE ***"
 16 PRINT:PRINT
 20 PRINT"SUPPLIER'S NAMES & ACC'T NO. ARE LISTED BELOW"
 25 CLEAR
 26 DIM A$(14)
 30 PRINT:PRINT"SELECT THE ACCOUNT BY NO.---"
 40 PRINT:PRINT:PRINT"     1. ALLEN MOTOR CO."
 50 PRINT"     2. CARL ANDERSON"
 60 PRINT"     3. BARRON MOTOR SUPPLY"
 70 PRINT"     4. CHUCK SMITH DIST."
 80 PRINT"     6. FLEETWAY STORES INC."
100 PRINT"     7. FIRST AVE. PLYMOUTH"
110 PRINT"     8. MOTOR EQUIPMENT"
120 PRINT"     9. NETOLICKY RADIATOR"
130 PRINT"    10. SIEG"
140 PRINT"    11. STEITZER LINCOLN"
150 PRINT"    12. VARNS & HUNTER"
160 PRINT"    13. BOB ZIMMWEMAN"
170 PRINT"    14. XTRA"
200 INPUT J
210 FOR X=1TO14
320 READ A$(X)
350 DATA AL-MOT,C-ANDR,BA-MOT,CSD,SEGER,FA-FL,FAP
360 DATA MO-EQ,NE-RAD,SIEG,STEITZ,V&H,B-ZIM,XTRA
365 IF X=J THEN 380
370 NEXT X
380 PRINTA$(X)
400 PRINT"TO READ ACC'T (R) ** TO WRITE ACC'T (W)
420 INPUT C$
430 IF C$="R" THEN 1000
440 IF C$="W"THEN 2000
1000 REM READ ACC'T
1005 Q=0
1006 RD=1
1010 DISK OPEN,6,A$(X)
1012 POKE 12042,64:POKE 12076,5
1015 PRINT"E     INVOICE/CK#     DATE     DEBIT     CREDIT     BAL"
1016 PRINT"-------------------------------------------------------"
1020 DISK GET,0:INPUT#6,E$:E=VAL(E$)
1030 FOR I=1TOE-1
1040 DISK GET,I
1042 GOTO1050
1045 Q=1
1050 INPUT#6,IN$,DA$,DB$,CR$
1080 PRINTI;TAB(6)IN$;TAB(20)DA$;
1085 IF Q=1 THEN PRINT
1086 T=LEN(DB$):S=LEN(CR$)
1090 D=VAL(DB$):C=VAL(CR$):B=B+(C-D)
1091 IF D=0 THEN 1094ELSE1092
1092 PRINT TAB(38-T)DB$:GOTO1096
```

```
1094 PRINTTAB(49-S)CR$
1096 IF Q=1 THEN GOTO2080
1097 RD=RD+1:IF RD>4THEN GOSUB 7000
1100 NEXT I
1120 DISK CLOSE,6
1125 BA=INT(B*100)/100:PRINTTAB(52)BA
1130 PRINT:PRINT:INPUT"ANOTHER ACC'T (Y) ** EDIT (E)";X$
1140 IF X$<>"E"THEN 20
1150 IF X$="E"THEN GOTO 6000
2000 REM WRITE/ACC'T
2010 PRINT"DEBIT OR CREDIT ACC'T":PRINT
2020 DISK OPEN,6,A$(X)
2025 POKE 12042,64:POKE 12076,5
2030 DISK GET,0
2040 INPUT#6,E$:E=VAL(E$)
2045 IF J=3THEN GOTO 8000
2050 IF E>60THEN PRINT"FILE FILLED":GOTO4090
2060 PRINT"ENTRY#  "E
2070 DISK GET,E
2080 INPUT"LIST INVOICE OR CK #";IN$:PRINT
2090 IF LEN(IN$)>8 THEN PRINT"TOO MANY NO.":GOTO2080PRINT
2100 PRINT"LIST DATE AS FOLLOWS - 10/15/79";:INPUT DA$:PRINT
2110 IF LEN(DA$)>8 THEN PRINT"INCORRECT!":GOTO 2100:PRINT
2120 PRINT"TO DEBIT ACC'T,ENTER INVOICE AMOUNT---?"
2121 INPUT"IF NO ENTRY---(0)";DB$
2130 IF LEN(DB$)>6THENPRINT"TOO MANY NO.":GOTO2120
2140 PRINT:PRINT"CREDIT ACC'T WITH CK AMOUNT------"
2141 INPUT"IF NO ENTRY---(0)";CR$
2150 IF LEN(CR$)>6THENPRINT"TOO MANY NO.":GOTO 2140:PRINT
2160 PRINT#6,IN$:PRINT#6,DA$:PRINT#6,DB$:PRINT#6,CR$
2165 IF Q=1THEN DISK PUT,I:GOTO 1130
2170 DISK PUT:DISK GET,0
2175 E=E+1:E$=STR$(E):PRINT#6,E$:DISK PUT
2180 PRINT:PRINT"ANOTHER ENTRY (A) *** FINISHED (F)"
2190 INPUT F$:IF F$="A"THEN 2030:IF F$="F"THEN4090
2192 IF F$="A"THEN 2050
2194 IF F$="F"THEN 20
4090 DISK CLOSE,6
5000 END
6000 REM EDIT RECORDS
6010 PRINT:INPUT"RECORD # TO EDIT";R:PRINT
6015 I=R
6020 DISK OPEN,6,A1(X)
6025 POKE 12042,64:POKE 12076,5
6030 DISK GET,I:GOTO 1045
7000 PRINT"-------------------------------------------------------------------------"
7010 RD=0:RETURN
8000 IF E>120 THEN PRINT"FILE FILLED":GOTO 4090
8010 GOTO 2060
```

INDUSTRIAL ARTS INTRODUCTION

COMPUTER: Apple II

LANGUAGE: Applesoft BASIC

AUTHOR: William James
Williamsburg Community School
Williamsburg, Iowa

APPLICATIONS: Instructional Management

INTRODUCTION: The program can be used to introduce students to the computer. This activity will allow students to see some of the capablilities of a computer. It also describes some of the uses of a computer in the industrial arts class.

THE PROGRAM:

```
  5 DIM N$(15)
 10 PRINT
 20 PRINT "WELCOME TO THE INDUSTRIAL "
 30 PRINT "ARTS COMPUTER CENTER"
 40 PRINT : PRINT : PRINT
 50 PRINT "PLEASE TYPE IN YOUR NAME SO"
 60 PRINT "I CAN GET TO KNOW YOU---"
 70 INPUT N$
 80 PRINT
 90 PRINT "THANKS, "N$", FOR BEING"
100 PRINT "INTERESTED IN WHAT COMPUTERS"
110 PRINT "CAN DO."
120 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
130 PRINT "LET ME INTRODUCE MYSELF"
140 PRINT "TO YOU, "N$"."
150 PRINT
160 PRINT "I AM YOUR SCHOOL COMPUTER."
170 PRINT "THERE ARE MANY WAYS IN WHICH"
180 PRINT "I CAN BE OF HELP TO YOU"
190 PRINT "IN YOUR INDUSTRIAL ARTS"
200 PRINT "CLASSES."
201 PRINT : PRINT : PRINT
202 PRINT "HIT RETURN";B$
203 PRINT B$
210 PRINT "HERE ARE JUST A FEW EXAMPLES; FIGURE BOARD FEET,
    TELL YOU THE COST OF YOUR PROJECT, CENTERING A DRAW
    ING ON PAPER."
220 PRINT : PRINT
230 PRINT "HOW ABOUT USING OHM'S LAW TO SOLVE ELECTRICITY PROB
    LEMS, FIND THE CORRECT AMPERAGE FOR A WELDING ROD."
240 PRINT : PRINT
250 PRINT "OR MAYBE YOU COULD CALCULATE PISTON DISPLACEMENT
    OF A CAR, RELATED TO YOU TAP DRILL SIZES."
```

```
252 PRINT : PRINT : PRINT
255 PRINT "WE WILL HAVE FUN DOING A LOT OF THINGS TOGETHER."
360 PRINT LIN(3)
370 PRINT "IT WILL BE A PLEASURE"
380 PRINT "WORKING WITH YOU, "N$"."
390 PRINT LIN(2)
400 PRINT "HIT RETURN KEY TO CONTINUE"A$
410 INPUT A$
420 FOR X = 1 TO 10
430 PRINT
440 NEXT X
450 PRINT "****LET ME SHOW YOU SOMETHING ABOUT MYSELF****"
470 PRINT "THE 'TERMINAL' IS THE DEVICE"
480 PRINT "THROUGH WHICH YOU TALK TO ME"
490 PRINT "AND BY WHICH I SPEAK TO YOU."
495 PRINT : PRINT
500 PRINT " YOUR TERMINAL MAY BE EITHER"
510 PRINT "A PRINTING DEVICE (RATHER"
520 PRINT "LIKE A TYPEWRITER) OR A"
530 PRINT "VIDEO DISPLAY SCREEN DEVICE"
540 PRINT "(SORT OF A CROSS BETWEEN"
550 PRINT " A TYPEWRITER AND A TELEVISION.)"
555 PRINT : PRINT
560 PRINT "HIT THE RETURN KEY TO"
570 PRINT "CONTINUE"A$
580 INPUT A$
590 FOR X = 1 TO 10
595 PRINT : PRINT : PRINT
600 NEXT X
610 PRINT "NOW I'M GOING TO SHOW YOU"
620 PRINT "WHAT I CAN DO.  I CAN TYPE A"
630 PRINT "LINE ALL THE WAY ACROSS THIS"
640 PRINT "THIS TERMINAL IN LESS THAN "
650 PRINT "ONE SECOND."
660 PRINT
670 PRINT "YOU DON'T BELIEVE ME DO YOU "N$"?"
685 PRINT : PRINT
690 INPUT "TYPE YES OR NO";C$
691 PRINT : PRINT : PRINT : PRINT : PRINT
700 PRINT
710 PRINT "JUST TO PROVE I AM RIGHT,"
720 PRINT "LET'S TRY IT....."
725 PRINT : PRINT
730 PRINT "TO VERIFY THIS HAVE SOMEONE"
740 PRINT "LOOK AT WATCH, WITH A SECOND"
750 PRINT "HAND.  I WILL TYPE OUT 20"
760 PRINT "LINES OF 80 CHARACTERS"
770 PRINT "EACH.  USE THE SECOND HAND"
780 PRINT "TO TIME ANY ONE OF THEM AND"
790 PRINT "YOU WILL SEE THAT IT TAKES"
800 PRINT "LESS THAN ONE SECOND TO TYPE"
810 PRINT "A LINE."
```

```
 815 PRINT : PRINT
 820 PRINT "HERE WE GO!!!  HIT RETURN TO START"
 821 INPUT A$
 830 FOR X = 1 TO 25: PRINT : NEXT X
 850 FOR X = 1 TO 20
 860 PRINT "I CAN TYPE LINES 80 CHARACTERS IN LENGTH, IN SECOND."
 890 NEXT X
 900 PRINT : PRINT : PRINT : PRINT
 910 PRINT "FOR ANOTHER EXAMPLE I CAN RECOGNIZE WORDS."
 915 PRINT : PRINT
 920 PRINT "TYPE IN THE CAPITAL OF IOWA."
 930 INPUT Y$
 940 IF Y$ = "DES MOINES" THEN 990
 950 IF Y$ = "DESMOINES" THEN 960
 955 PRINT "I KNOW BETTER THAN THAT!!!! TRY ONCE MORE."
 958 PRINT : PRINT : PRINT : PRINT
 959 GOTO 915
 960 PRINT "THAT WAS CLOSE, BUT YOU SHOULD SEPARATE THE TWO
         WORDS WITH A SPACE."
 962 PRINT "  PLEASE TRY AGAIN."
 970 PRINT : PRINT : PRINT
 980 GOTO 915
 990 PRINT : PRINT
1000 PRINT "THAT IS RIGHT!!!! NOW I'LL SHOW YOU WHERE THE CAPITAL
         IS....."
1001 PRINT : PRINT : PRINT : PRINT
1020 PRINT "   **************"
1030 PRINT "    *             *"
1040 PRINT "    *             *"
1050 PRINT "     *     *      *"
1060 PRINT "     *     DES    *"
1070 PRINT "    *    MOINES   *"
1080 PRINT "   *              *"
1090 PRINT "   *              *"
1100 PRINT "   **************"
1110 PRINT "                  *"
1120 PRINT : PRINT : PRINT
1130 PRINT : PRINT
1140 INPUT "TYPE 'YES' TO PROCEED";X$
1141 PRINT : PRINT
1150 PRINT "I CAN ALSO DO ARITHMETIC VERY FAST."
1160 PRINT : PRINT
1161 LET Q = 0
1165 PRINT "GIVE ME 2 NUMBERS YOU WOULD LIKE ME TO ADD------"
1175 PRINT "    (DO NOT USE COMMAS)"
1177 PRINT " (ONLY EIGHT DIGIT NUMBERS)"
1180 PRINT
1181 INPUT "FIRST NUMBER";A
1182 INPUT "SECOND NUMBER";B
1190 PRINT : PRINT
1200 PRINT "ANSWER:  ";A;"+";B;"=";A + B
1210 PRINT : PRINT : PRINT : PRINT
```

```
1230 IF Q - 1 THEN 1270
1240 PRINT "LET'S TRY MORE": LET Q = 1:  GOTO 1130 LIST 1130
1250 INPUT "TYPE IN 'YES' TO GO ON:";X$
1260 PRINT : PRINT : PRINT
1270 PRINT "  I CAN REMEMBER INFORMATION AND CHECK YOUR INPUT
     AGAINST IT."
1275 PRINT : PRINT : PRINT
1280 PRINT "HAVE SOMEONE TURN SO THEY CAN'T SEE THIS SCREEN."
1290 INPUT "HIT RETURN WHEN READY";D$
1300 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
1310 PRINT "NOW HAVE SOMEONE ELSE TYPE IN A TWO DIGIT NUMBER."
1320 PRINT "BE SURE SOMEONE ELSE KNOWS IT BEFORE YOU HIT RE
     TURN."
1340 INPUT R
1350 FOR X = 1 TO 20: PRINT : NEXT X
1360 PRINT : PRINT : PRINT
1370 PRINT "NOW HAVE THE PERSON WHO IS TURNED AWAY SIT DOWN
     AT THE TERMINAL."
1380 INPUT "TYPE 'YES' WHEN READY.";R$
1390 PRINT : PRINT : PRINT : PRINT
1400 PRINT "YOU WILL TRY TO GUESS THE TWO DIGIT NUMBER THAT
     YOUR FRIEND GAVE ME.": PRINT : PRINT : PRINT
1420 PRINT "TYPE YOUR FIRST GUESS";
1422 INPUT C
1430 IF C = R THEN 1490
1440 IF C > R THEN 1470
1450 PRINT "THAT'S TOO LOW--GUESS AGAIN: ";
1460 GOTO 1422
1470 PRINT "THAT'S TOO HIGH--GUESS AGAIN: ";
1480 GOTO 1422
1490 PRINT : PRINT : PRINT : PRINT
1500 PRINT "******ABSOLUTELY RIGHT******"
1505 PRINT : PRINT : PRINT
1510 INPUT "TYPE 'YES' TO GO ON.";R$
1520 PRINT : PRINT : PRINT : PRINT
1530 PRINT : PRINT : PRINT : PRINT
1550 PRINT "I CAN COUNT IN RESPONSE TO YOUR COMMAND."
1560 LET F = 0
1570 PRINT "TELL ME HOW MANY STARTS YOU WOULD LIKE ME TO PRINT
     OUT."
1580 PRINT "(PICK A NUMBER LESS THAN 15 FOR CONVENIENCE.)"
1590 INPUT S
1600 IF S <15 THEN 1650
1610 PRINT "COME ON!!! THAT'S NOT LESS THAN 15 AND YOU KNOW IT!!"
1620 PRINT : PRINT : PRINT : PRINT
1630 PRINT "     TRY ME AGAIN....."
1640 GOTO 1590
1650 FOR X = 1 TO S
1655 PRINT : PRINT
1660 PRINT "*";
1670 NEXT X
```

```
1680 PRINT : PRINT : PRINT : PRINT
1700 IF F = 1 THEN 1750
1710 PRINT "I'LL DO IT ONCE MORE."
1720 LET F = 1
1730 PRINT : PRINT : PRINT
1740 GOTO 1570
1750 PRINT : PRINT : PRINT : PRINT
1760 INPUT "TYPE 'YES' FOR MORE:  ";X$
1770 IF X$ = "YES" THEN 2000
1780 PRINT "KEEP THIS UP AND WE'LL BE HERE ALL DAY!!!!"
1790 GOTO 1760
2000 PRINT : PRINT : PRINT : PRINT
2010 PRINT "SOMETIMES WHEN I'M TIRED!!!!!!"
2020 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
     : PRINT : PRINT : PRINT : PRINT
2030 FOR X = 1 TO 10
2040 PRINT "      I      GET      WILD      AND      CRAZY      LIKE
     THIS....."
2041 PRINT : PRINT : PRINT : PRINT : PRINT
2042 PRINT "HIT RETURN TO SEE."G$
2045 INPUT G$
2060 T = 0
2070 PRINT CHR$ (7)
2072 LET T = T + 1
2073 IF T >5 THEN 2084
2080 FOR D = 1 TO 40
2082 PRINT : PRINT
2084 NEXT D
2095 PRINT : PRINT : PRINT
2130 PRINT "BUT REMEMBER....."
2140 PRINT "WHATEVER I DO, SOMEONE HAS PROGRAMMED ME TO DO
     IT."
2150 PRINT : PRINT
2153 FOR HUMANSDO = 1 TO 10
2155 FLASH
2160 PRINT "  H U M A N S   D O     "
2170 PRINT "    C O N T R O L       "
2180 PRINT "       C O M P U T E R S !!!"
2190 NORMAL
2210 PRINT : PRINT
2220 PRINT "I HOPE THAT AFTER SHOWING YOU SOME OF THE ABILITIES
     THAT I HAVE YOU WILL WANT TO USE ME IN YOUR INDUS
     TRIAL ARTS CLASS."
2221 PRINT : PRINT
2222 PRINT "THANKS FOR YOUR TIME, "N$"."
2223 PRINT "I HOPE TO BE TALKING TO YOU AGAIN REAL SOON . . . . . .
     . . . .BYE!!!"
2224 PRINT : PRINT :
2225 PRINT "YA'LL COME BACK NOW YA HEAR."
2229 PRINT "TO START OVER PRESS RETURN."
2230 INPUT B$
2240 GOTO 20
2250 HOME
2260 END
```

** INVENTORY **

COMPUTER: O.S.I. C2-4P; Informer
(This program will require minimum 5¼" disk drive.)

LANGUAGE: Microsoft BASIC; Informer BASIC

AUTHOR: John Lyman
Kennedy High School
Cedar Rapids, Iowa

APPLICATION: Instructional Management

INTRODUCTION: This program is designed for the control of inventory in the industrial arts areas. Currently this program is set up for an auto shop, but can be changed slightly for use in any industrial arts shop.

The program stores inventory items by stock number, name, quantity, units/price and a code. You can add to inventory, update quantity or price, edit an inventory item (rewrite), read total inventory or read total inventory by code. A read command will print on a video screen or hard copy printer all of the information found on each inventory item. Price extentions and price totals are included.

If information is kept current, an accurate inventory control program can be maintained for stock items. However, before using be sure you understand the data file structure of your computer.

Record pointers are kept in record "0" for the O.S.I. computer and are used to keep track of the random records that have been placed in the files.

To initialize the files, it will be necessary to create data files and write into record 0 the beginning pointer number. A small program called "HOLD-2" is included to initialize the files.

Some changes in the program will be needed to match your own needs. However, this should be minimal.

RUN (SAMPLE)

** INVENTORY CONTROL PROGRAM **

Kennedy H.S. Cedar Rapids, Ia.

THIS IS AN INVENTORY CONTROL FOR AUTO MECH. & WILL GIVE A LIST OF STOCK ITEMS IN THE INVENTORY WITH PRICES & EXTENSIONS & QUANTITY ON HAND.

```
E     STOCK #      ITEM          UNIT   QN    PRICE    EXT     C
-------------------------------------------------------------------

1     B-1          OIL FILTER    EA     5     2.50     12.50   OF
2     B-9          OIL FILTER    EA     3     3.00      9.00   OF
3     PA-2002      AIR FILTER    EA     2     4.36      8.72   AF
4     PA-2008      AIR FILTER    EA     2     3.47      6.94   AF
5     N-14Y        CHAMPION      EA     16    1.00     16.00   SP
-------------------------------------------------------------------

6     RBL-9Y       CHAMPION      EA     16    1.25     20.00   SP

      TOTAL VALUE OF INVENTORY IS $ 73.16
```

THE PROGRAM:

```
    5 REM INVENTORY CONTROL BY JOHN LYMAN KENNEDY HIGH SCHOOL
    6 REM Feb. 1980 INDUSTRIAL ARTS DEPT.
   10 PRINT"READ OUT MODE    (1) VIDEO ONLY"
   20 PRINT"                 (2) PRINTER ONLY"
   30 PRINT"                 (3) BOTH"
   40 INPUT X:ON X GOTO 60,70,80
   60 DISK!"IO ,02":GOTO 90
   70 DISK!"IO ,08":GOTO 90
   80 DISK!"IO ,0A":GOTO 90
   90 DISK OPEN,6,"INVT"
  100 POKE 12042,32:POKE 12076,6
  110 GOSUB 11000
  120 PRINTCHR$(14)+"     ** INVENTORY CONTROL PROGRAM **"
  122 PRINT:PRINT"                                  Kennedy H.S. Cedar Rapids, Ia."
  125 PRINT:PRINT"SELECT FUNCTION"
  130 PRINT"     (1) READ INVENTORY FILE"
  140 PRINT"     (2) WRITE NEW ENTRY"
  150 PRINT"     (3) UPDATE INVENTORY"
  160 PRINT"     (4) EDIT ENTRY"
  170 PRINT"     (5) INVENTORY BY CODE"
  200 INPUT Y: ON Y GOTO 1000,2000,3000,4000,5000
 1000 REM READ INVT
 1010 PRINT:PRINT:PRINT"THIS IS AN INVENTORY CONTROL FOR AUTO
          MECH. & WILL GIVE"
 1020 PRINT"A LIST OF STOCK ITEMS AND NUMBERS ON HAND."
 1030 RD=0:ET=0
 1035 PRINT:PRINT
 1040 GOSUB 10000
 1060 DISK GET,0:INPUT#6,E$:E=VAL(E$)
 1070 FOR I=1TOE-1
 1080 DISK GET,1
 1090 INPUT #6,S$,N$,U$,Q$,P$,CD$
 1095 IF CD$<>C1$AND Q=1 THEN 1230
 1100 EX =VAL(Q$)*VAL(P$)
 1110 EX=INT(EX*100)/100
 1120 ET=ET+EX
 1200 PRINTITAB(5)S$TAB(19)N$TAB(32)U$TAB(38)Q$;
```

```
1205 PRINTTAB(43)P$TAB(52)EXTAB(61)CD$
1220 RD=RD+1:IF RD>4THEN GOSUB 10010
1230 NEXT I
1250 PRINT:PRINT"   TOTAL VALUE OF INVENTORY IS $";ET
1300 PRINT:PRINT"FINISH (F) -- ANOTHER FUNCTION (N)"
1310 INPUT F$:IF F$="N"THEN 125
1900 GOTO 9000
2000 REM ADD NEW INVT ITEM
2005 R=0
2010 PRINT:PRINT:PRINT"  YOU CAN NOW ADD A NEW ITEM TO THE INVE
     NTORY LIST."
2020 PRINT"FOLLOW THE INSTRUCTIONS AS GIVEN."
2040 DISK GET,0
2050 INPUT #6,E$:E=VAL(E$)
2060 PRINT:PRINT"TO ADD A NEW INVENTORY ITEM, GIVE INFORMATION
     AS IT IS"
2065 PRINT"CALLED FOR."
2070 PRINT:PRINT"ENTRY #"E
2080 DISK GET,E
2090 INPUT "STOCK #  (12 NUMBERS ONLY)";S$
2100 IF LEN(S$)>12 THEN PRINT "TOO MANY CHARACTERS":GOTO 2110
2110 PRINT:INPUT"ITEM  (11 CHARACTERS ONLY)";N$
2120 IF LEN(N$)>11THENPRINT"TOO MANY CHARACTERS";GOTO 2110
2130 PRINT:INPUT"UNITS OF MEASURE (4 CHARACTERS ONLY)";U$
2140 IF LEN(U$)>4THENPRINT"TOO MANY CHARACTERS":GOTO 2130
2150 PRINT:INPUT"QUAN ON HAND (3 DIGITS ONLY)";Q$
2160 IF LEN(Q$)>3THEN PRINT"TOO MANY NO.";GOTO 2150
2170 PRINT:INPUT"PRICE/QUAN   (5 DIGITS W/DECIMAL)";P$
2180 IF LEN(P$)>6THEN PRINT"TOO MANY NO.":GOTO 2170
2190 PRINT:INPUT "CODE  (2 NUMBERS OR LETTERS)";CD$
2200 PRINT#6,S$:PRINT#6,N$:PRINT#6,U$:PRINT#6,Q$:PRINT#6,P$:PRINT#6,
     CD$
2205 IF R=1THEN GOTO 4060
2210 DISK PUT:DISK GET,0
2220 E=E+1:E$=STR$(E):PRINT#6,E$:DISK PUT
2230 PRINT:PRINT"ANOTHER ENTRY (A) -- FINISHED (F) -- ANOTHER FUNC
     TION (N)"
2240 INPUT F$:IF F$="A"THEN 2040
2250 IF F$="F"THEN 9000
2260 IF F$="N"THEN 125
2270 GOTO 9000
3000 REM UPDATE - CHANGE INVT QUAN
3010 PRINT:PRINT:PRINT"TO CHANGE THE INVENTORY AMOUNTS, FOL
     LOW THE INSTRUCTIONS"
3020 PRINT:INPUT"STOCK # TO CHANGE ";G$
3040 GOSUB 7000
3050 PRINT:PRINT"CHANGE INVENTORY AMOUNTS (Q)  -OR- PRICE (P)
3060 INPUT C$:IF C$="Q" THEN 3080
3065 IF C$="P"THEN 3090
3080 INPUT"CHANGE QUANTITY ON HAND TO --";Q$:GOTO 3100
3090 INPUT"CHANGE PRICE TO --";P$
3100 DISK GET,I
```

```
3110 PRINT#6,S$:PRINT#6,N$:PRINT#6,U$:PRINT#6,Q$:PRINT#6,P$:PRINT#6,
     CD$
3120 DISK PUT,1
3130 PRINT:PRINT:PRINT"ANOTHER ENTRY (A) -- FINISHED (F) --ANOTHER
     FUNCTION (N)"
3140 INPUT F$:IF F$="A"THEN 3020
3150 IF F$="F"THEN 9000
3160 IF F$="N"THEN 125
4000 REM EDIT INVENTORY ENTRY
4010 PRINT:PRINT:PRINT"AN INVENTORY ITEM CAN BE CHANGED BY FOL
     LOWING THE"
4020 PRINT"INSTRUCTIONS."
4030 PRINT:PRINT:INPUT"LIST THE STOCK NO. TO BE CHANGED";G$
4040 GOSUB 7000
4050 R=1:GOTO 2090
4060 DISK PUT,1:GOTO 125
5000 REM READ INVENTORY BY CODE
5010 PRINT:PRINT:PRINT"INVENTORY ITEMS WITH A GIVEN CODE CAN BE
     LISTED ALONE"
5020 PRINT:INPUT"GIVE CODE YOU WISH TO LIST.";C1$
5040 Q=1:GOTO 1030
7000 DISK GET,0:INPUT #6,E$:E=VAL(E$)
7010 FOR I=1TOE-1
7020 IF A$(I)=G$THEN 7075
7050 NEXT I
7060 PRINT"SORRY, STOCK NO. NOT IN FILE!!"
7070 GOTO 125
7075 DISK GET,1
7080 INPUT#6,S$,N$,U$,Q$,P$,CD$
7085 GOSUB 10300
7090 PRINTITAB(5)S$TAB(19)N$TAB(32)U$TAB(38)Q$;
7091 PRINTTAB(43)P$TAB(61)CD$
7100 RETURN
9000 DISK CLOSE,6
9005 DISK!"IO ,02"
9010 END
10000 PRINT"E    STOCK #    ITEM    UNIT    QN    PRICE    EXT    C"
10010 PRINT"----------"
10020 RE=0:RETURN
11000 DISK GET,0:INPUT #6,E$:E=VAL(E$)
11010 DIMA$(300)
11020 FOR X=1TO E-1
11025 DISK GET,X
11030 INPUT #6,S$
11040 A$(X)=S$
11050 NEXT X
11060 RETURN
```

HOLD-2

```
 5 REM FOR OSI COMPUTER
10 REM PROGRAM "HOLD-2"
20 DISK OPEN,6, "INVT"
30 DISK GET,1
40 E=1: E$=STR$(E)
50 PRINT #6, E$
60 DISK PUT
70 DISK CLOSE ,6
80 END
```

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MEAN AND STANDARD DEVIATION

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Marvin Berg
Fort Dodge Senior High
Fort Dodge, Iowa

APPLICATION: Instructional Management

INTRODUCTION. This program will calculate the mean and standard deviation for a group of test scores. You must have a copy of all test scores as well as the number of test scores when using this routine.

Standard deviation can be a very lengthy set of computations without the use of the computer. This program provides the user that additional statistic while calculating the mean score. The mean is considered the most accurate measure of central location for a given set of test scores. The standard deviation provides a more accurate estimate of the population parameter.

THE PROGRAM:

```
 10 PRINT TAB(5)"THIS ROUTINE WILL CALCULATE THE MEAN AND
        STANDARD DEVIATION"
 20 PRINT "FOR A SET OF TEST SCORES."
 30 FILES *
 40 CREATE R9,"MSLB",1
 50 ASSIGN "MSLB",1,R9
 60 LET X1=0
 70 LET X5=0
 80 LET X=0
 90 PRINT TAB(5) "HOW MANY SCORES ARE IN THIS GROUP?";
100 INPUT S
110 PRINT LIN(1)
120 PRINT TAB(5)"YOU WILL ENTER EACH SCORE AND PUSH THE RETURN
        FOR AS MANY"
130 PRINT "SCORES AS YOU INDICATED WOULD BE IN THIS GROUP."
140 FOR N=1 TO S
150 PRINT "ENTER SCORE";N
160 INPUT X
170 REM ***** PRINT DATA INTO THE FILE
180 PRINT #1;X
190 NEXT N
200 REM ***** RESET THE FILE TO 1
210 READ #1,1
220 FOR N=1 TO S
230 REM ***** READING FROM FILE
240 READ #1;X
250 LET X1=X1+X
```

```
260 NEXT N
270 LET X2=X1/S
280 REM ***** RESET THE FILE TO 1
290 READ #1,1
300 FOR N=1 TO S
310 REM ***** READING FROM THE FILE
320 READ #1;X
330 LET X3=X-X2
340 LET X4=X3**2
350 LET X5=X5+X4
360 NEXT N
370 LET X6=SQR(X5/S)
380 PRINT LIN(1)
390 PRINT TAB(15)"THE MEAN SCORE FOR THIS GROUP = ";
400 PRINT USING "#,4D.2D";X2
410 PRINT LIN(1)
420 PRINT TAB(15)"THE STANDARD DEVIATION = ";
430 PRINT USING "#,4D.2D";X6
440 ASSIGN *,1
450 PURGE R9,"MSLB"
460 END
```

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RECORD SYSTEM

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Michael Garoutte
Linn-Mar Junior High
Marion, Iowa

APPLICATION: Classroom Management

INTRODUCTION: This program will provide a record system for keeping students names and scores (up to eight entries). You can add new student names and update scores already stored in the files.

When given the command to print names, scores and averages; the computer will give you a listing of all student names with the information shown below:

```
1. MIKE G.
     SCORE # 1      94.2
     SCORE # 2      90.1
     SCORE # 3      70
     SCORE # 4     100
     SCORE # 5      90
        ****TOTAL = 444.3 AVERAGE = 88.86****

2. DAVE A.
     SCORE # 1      80
     SCORE # 2      70.2
     SCORE # 3      60
     SCORE # 4      90
     SCORE # 5      80
        ****TOTAL = 380.2 AVERAGE = 76.04****
```

Before running the program it will be necessary to create nine files as follows:

```
CRE-NAMEFL,10
CRE-SCFL1,1
CRE-SCFL2,1
CRE-SCFL3,1
CRE-SCFL4,1
CRE-SCFL5,1
CRE-SCFL6,1
CRE-SCFL7,1
CRE-SCFL8,1
```

THE PROGRAM:

```
10 FILES NAMEFL,SCFL1,SCFL2,SCFL3,SCFL4,SCFL5,SCFL6,SCFL7,SCFL8
20 DIM B$[5],C$[5],D$[5],E$[5],F$[5]
30 PRINT "STUDENT RECORD FILE"
40 PRINT "†††††† †††††† ††††"
50 READ #1,1
```

```
 60 READ #2,1
 70 READ #3,1
 80 READ #4,1
 90 READ #5,1
100 READ #6,1
110 READ #7,1
120 READ #8,1
130 READ #9,1
140 PRINT
150 PRINT "THE FOLLOWING TASKS MAY BE COMPLETED IN THIS FILE:"
160 PRINT "1) CREATE NEW FILE FOR NAMES."
170 PRINT "2) ADD TO THE OLD FILE OF NAMES."
180 PRINT "3) CREATE NEW FILE FOR SCORES."
190 PRINT "4) UPDATE OLD SCORE FILES."
200 PRINT "5) PRINT NAMES WITH SCORES AND AVERAGES."
210 PRINT "6) I AM DONE."
220 PRINT
230 PRINT "WHAT TASK DO YOU WISH TO COMPLETE";
240 INPUT A
250 PRINT
260 PRINT
270 IF A=1 THEN 1000
280 IF A=2 THEN 2500
290 IF A=3 THEN 2000
300 IF A=4 THEN 3500
310 IF A=5 THEN 4000
320 END
1000 REM ######## CREATE NEW FILE FOR NAMES ########
1010 PRINT
1020 PRINT "TYPE IN -1 TO BREAK OUT OF THE USE OF THE FILE."
1030 PRINT
1040 IF END #1 THEN 1110
1050 DIM N$[30]
1060 PRINT "STUDENT NAME ";
1070 INPUT N$
1080 IF N$="-1" THEN 1110
1090 PRINT #1;N$
1100 GOTO 1060
1110 PRINT
1120 PRINT "DO YOU WISH ANOTHER TASK";
1130 INPUT B$
1140 IF B$[1,1]="Y" THEN 50
1150 END
2000 REM ######### CREATE NEW FILE FOR SCORES #########
2010 IF END #1 THEN 2240
2020 READ #1,1
2030 READ #2,1
2040 READ #3,1
2050 READ #4,1
2060 READ #5,1
2070 READ #6,1
2080 READ #7,1
```

```
2090 READ #8,1
2100 READ #9,1
2110 PRINT
2120 PRINT "TYPE IN -1 TO BREAK OUT OF THIS FILE TASK."
2130 PRINT
2140 PRINT "WHICH SET OF SCORES ARE YOU RECORDING (1, 2, 3, ETC.)";
2150 INPUT G
2160 F=G+1
2170 PRINT
2180 READ #1;N$
2190 PRINT N$;" - SCORE";
2200 INPUT S
2210 IF S=-1 THEN 2240
2220 PRINT #F;S
2230 GOTO 2180
2240 PRINT
2250 PRINT "DO YOU WISH TO ENTER ANOTHER SET OF SCORES";
2260 INPUT C$
2270 IF C$[1,1]="Y" THEN 2000
2280 PRINT
2290 PRINT "DO YOU WISH ANOTHER TASK";
2300 INPUT B$
2310 IF B$[1,1]="Y" THEN 50
2320 END
2500 REM ######## ADD TO THE OLD FILE OF NAMES ########
2510 GOSUB 4500
2520 PRINT
2530 PRINT "WHAT IS THE ITEM NUMBER OF THE LAST SUDENT'S NAME
     LISTED IN"
2540 PRINT "THE NAME FILE";
2550 INPUT X
2560 ADVANCE #1;X,Z
2570 GOTO 1020
2580 END
3500 REM  ########  UPDATE OLD SCORE FILES  ########
3510 READ #1,1
3520 READ #2,1
3530 READ #3,1
3540 READ #4,1
3550 READ #5,1
3560 READ #6,1
3570 READ #7,1
3580 READ #8,1
3590 READ #9,1
3600 IF END #1 THEN 3790
3610 PRINT "TYPE IN -1 IF YOU WISH TO BREAK OUT OF THE USE OF THIS
     TASK."
3620 PRINT
3630 PRINT "WHICH SET OF SCORES DO YOU WISH TO UPDATE";
3640 INPUT D
3650 PRINT
3660 E=D+1
```

```
3670 I=ITM(1)
3680 R=REC(1)
3690 READ #1;N$
3700 READ #E;S1
3710 PRINT "THE SCORE FOR "N$" IS NOW "S1
3720 PRINT "NEW SCORE";
3730 INPUT S1
3740 IF S1=-1 THEN 3790
3750 READ #E,R
3760 ADVANCE #E;I,X
3770 UPDATE #E;S1
3780 GOTO 3670
3790 PRINT
3800 PRINT "DO YOU WISH TO UPDATE ANOTHER SET OF SCORES";
3810 INPUT F$
3820 PRINT
3830 IF F$[1,1]="Y" THEN 3500
3840 PRINT "DO YOU WISH ANOTHER TASK";
3850 INPUT B$
3860 IF B$[1,1]="Y" THEN 50
3870 END
4000 REM  ######## PRINT NAMES WITH SCORES AND AVERAGES ########
4010 READ #1,1
4020 READ #2,1
4030 READ #3,1
4040 READ #4,1
4050 READ #5,1
4060 READ #6,1
4070 READ #7,1
4080 READ #8,1
4090 READ #9,1
4100 IF END #1 THEN 4390
4110 READ #1,1
4120 PRINT "IF YOU WANT JUST A LIST OF NAMES IN THIS FILE, TYPE
     IN A"
4130 PRINT " '0' AFTER THE FOLLOWING QUESTION:"
4140 PRINT
4150 PRINT "WHAT IS THE NUMBER OF THE LAST SET OF SCORES THAT
     YOU WANT PRINTED"
4160 INPUT B
4170 PRINT
4180 PRINT "================================="
4190 DIM S[20]
4200 PRINT
4210 READ #1;N$
4220 PRINT N$;TAB(25)"-"
4230 IF B<1 THEN 4250
4240 GOTO 4270
4250 PRINT " "
4260 GOTO 4210
4270 T=0
4280 FOR B1=1 TO B
```

```
4290 B2=B1+1
4300 READ #B2;S[B1]
4320 IF S[B1]=0 THEN 4200
4330 T=T+S[B1]
4340 NEXT B1
4350 A=T/B
4360 A1=(INT(A*100+.5)/100)
4370 PRINT TAB(10)"**** TOTAL =";T;"AVERAGE = ";A1;" ****"
4380 GOTO 4200
4390 PRINT "================================="
4400 PRINT
4410 PRINT "DO YOU WISH TO PRINT MORE NAMES AND/OR SCORES";
4420 INPUT E$
4430 PRINT
4440 IF E$[1,1]="Y" THEN 4000
4450 PRINT "DO YOU WISH ANOTHER TASK";
4460 INPUT D$
4470 IF D$[1,1]="Y" THEN 50
4480 END
4500 IF END #1 THEN 50
4510 IF END #2 THEN 50
4520 IF END #3 THEN 50
4530 IF END #4 THEN 50
4540 IF END #5 THEN 50
4550 IF END #6 THEN 50
4560 IF END #7 THEN 50
4570 IF END #8 THEN 50
4580 IF END #9 THEN 50
4590 RETURN
4600 END
```

STANDARD SCORES

COMPUTER: HP 2000 Timesharing

LANGUAGE: HP BASIC

AUTHOR: Marvin Berg
Fort Dodge Senior High
Fort Dodge, Iowa

APPLICATION: Instructional Management

INTRODUCTION: This is a program that will calculate and print the standard score for any group of scores. In order to use the program, you will need a copy of all scores to be entered for calculation.

Both standard deviation and the mean are excellent grading statistics since they are considered the most accurate value of central location and variance. The standard score printed in this program may be used for grading since it has unit deviation. If scores are processed in the preceding manner, they have the advantage of further analysis by correlation.

THE PROGRAM:

```
 10 PRINT TAB(5)"THIS ROUTINE WILL CALCULATE THE MEAN AND STAN
        DARD DEVIATION"
 20 PRINT "FOR A SET OF TEST SCORES.  IT WILL ALSO PRINT A LIST OF"
 30 PRINT "STANDARD SCORES FOR EACH SCORE IN THE GROUP."
 40 FILES *
 50 CREATE R9,"MSLB",1
 60 ASSIGN "MSLB",1,R9
 70 LET X1=0
 80 LET X5=0
 90 LET X=0
100 PRINT TAB(5)"HOW MANY SCORES ARE IN THIS GROUP?";
110 INPUT S
120 PRINT LIN(1)
130 PRINT TAB(5)"YOU WILL ENTER EACH SCORE AND PUSH THE RETURN
        FOR AS MANY"
140 PRINT "SCORES AS YOU INDICATED WOULD BE IN THIS GROUP."
150 FOR N=1 TO S
160 PRINT "ENTER SCORE";N
170 INPUT X
180 REM ****** PRINT DATA INTO THE FILE
190 PRINT #1;X
200 NEXT N
210 REM ****** RESET THE FILE TO 1
220 READ #1,1
230 FOR N=1 TO S
240 REM ****** READING FROM FILE
250 READ #1;X
260 LET X1=X1+X
```

```
270 NEXT N
280 LET X2=X1/S
290 REM ****** RESET THE FILE TO 1
300 READ #1,1
310 FOR N=1 TO S
320 REM ****** READING FROM THE FILE
330 READ #1;X
340 LET X3=X-X2
350 LET X4=X3**2
360 LET X5=X5+X4
370 NEXT N
380 LET X6=SQR(X5/S)
390 PRINT LIN(1)
400 PRINT TAB(15)"THE MEAN SCORE FOR THIS GROUP = ";
410 PRINT USING "#,4D,2D";X2
420 PRINT LIN(1)
430 PRINT TAB(15)"THE STANDARD DEVIATION = ";
440 PRINT USING "#,4D,2D";X6
450 PRINT LIN(2)
460 PRINT "NUMBER","SCORE"," Z SCORE"
470 READ #1,1
480 FOR N=1 TO S
490 READ #1;X
500 LET Z=(X-X2)/X6
510 PRINT TAB(2),N,TAB(2),X,TAB(20),
520 PRINT USING "#,4D,2D";Z
530 PRINT
540 NEXT N
550 ASSIGN *,1
560 PURGE R9,"MSLB"
570 END
```

STUDENT GRADE PERCENTAGE CHART

COMPUTER: HP Timesharing

LANGUAGE: HP BASIC

AUTHOR: Michael Garoutte
Linn-Mar Junior High School
Marion, Iowa

APPLICATIONS: Instructional Management

INTRODUCTION: This program can be used to determine percentage equivalents to student scores on tests or worksheets. It is designed to print out a chart giving 1) number wrong, 2) number right, 3) percent and 4) decimal. The instructor may wish to print out and display this chart to the class after giving a test or some other type of evaluation instrument.

THE PROGRAM:

```
 10 PRINT TAB(9)"NUMBER OF POINTS";
 20 INPUT X
 30 PRINT TAB(9)"==================="
 40 PRINT
 50 PRINT
 60 PRINT
 70 PRINT TAB(9)"NUMBER"TAB(24)"NUMBER"
 80 PRINT     TAB(9)"WRONG"TAB(24)"RIGHT"TAB(39)"PERCENT"TAB(55)
        "DECIMAL"
 90 PRINT TAB(9)"-----------------------------------------------------"
100 Z=10
110 B=Z
120 A=X-B
130 D=B/X
140 K=(INT(D*1000+.5)/1000)
150 REM****  NOTE:  THE STATEMENT ABOVE IS USED TO ROUND
        NUMBERS.
160 REM****  FOR EXAMPLE, .6666 WOULD END UP BEING PRINTED AS
        .667
170 REM****  WHEN USING THIS STATEMENT.
180 J=K*10
190 C=K*100
200 IF Z=J THEN 220
210 IF Z<J THEN 220
220 PRINT TAB(9);A;TAB(24);B;TAB(39);C;TAB(55);J
230 B=B-1
240 IF B>=0 THEN 120
250 END
```

TEST CREATE

COMPUTER: Informer Series (This program will require minimum 5¼" disk drive.)

LANGUAGE: Informer BASIC

AUTHOR: John Lyman
Kennedy High School
Cedar Rapids, Iowa

APPLICATION: Instructional Management

INTRODUCTION: A real time saver for teachers is a fast means of constructing tests. The program "Test Create" was written to use a minicomputer for this purpose.

With "Test Create" you can write true-false and multiple choice questions and store these questions in a file for later use. You are limited in the number of questions you can write only by your available file space. An edit function has been included for the correction of previously written questions.

To give tests to students, use the program "Test Time". You can vary this program to your own needs and file space.

With the use of "Test Create" and "Test Time", areas of modification and changes may be found which merit further refinement.

Sample:

```
                    ** TEST CREATE **

-------------------------------------------------------------------------------
TESTS CAN BE CREATED USING THIS PROGRAM FOR ANY
SUBJECT USING THE FORMAT SET FORTH BELOW.  (CR)
MEANS CARRIAGE RETURN
-------------------------------------------------------------------------------

TEST NAME  (8 CHARACTERS & SPACES ONLY)?  TEST-1
    (N) ENTER NEW QUESTION
    (O) EDIT OLD QUESTIONS
    (F) FINISHED
? N

-------------------------------------------------------------------------------
BOTH TRUE-FALSE AND MULTIPLE CHOICE QUESTIONS
CAN BE WRITTEN WITH THIS TEST GENERATOR.  PLEASE
SPECIFY THE NUMBER OF EACH BELOW.  IF THE
QUESTIONS ARE OF ONE KIND ONLY, THEN INDICATE
WITH THE PROPER NUMBER OF QUESTIONS FOR THAT
KIND ONLY DEPRESS(CR) FOR OTHERS.
-------------------------------------------------------------------------------

NUMBER OF QUESTIONS TRUE-FALSE?  1

NUMBER OF QUESTIONS MULTIPLE CHOICE?  1
```


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SELECT THE TYPE OF QUESTIONS YOU WISH TO HAVE FIRST. IF THE QUESTIONS ARE ALL OF THE SAME TYPE, SELECT THOSE FIRST.

(1) TRUE-FALSE
(2) MULTIPLE CHOICE

YOUR SELECTION BY NO. - ? 1

YOU CAN NOW PROCEED TO WRITE 1 TRUE-FALSE QUESTIONS. YOU MAY USE 110 CHARACTERS AND SPACES TO MAKE UP YOUR QUESTIONS. IF YOU EXCEED THIS NUMBER, YOU WILL BE ASKED TO REWRITE THE QUESTION. INSERT THE CORRECT ANSWER FOR THE QUESTION AS CALLED FOR

QUESTION NO. 1 GASOHOL IS MADE UP OF 90% GASOLENE AND 10% ALCOHOL

ANSWER - T OR F ? T

YOU CAN NOW PROCEED TO WRITE 1 MULTIPLE CHOICE QUESTION. YOU MAY USE 75 CHARACTERS AND SPACES FOR YOUR QUESTION. IF YOU EXCEED THIS NUMBER, YOU WILL BE ASKED TO REWRITE THE QUESTION. ALSO LIST UP TO 4 MULTIPLE CHOICE ANSWERS. EACH OF THESE SHOULD BE ONLY 10 CHARACTERS LONG. THE NUMBER OF THE CORRECT ANSWER SHOULD BE ENTERED AS CALLED FOR.
IF 4 MULTIPLE CHOICE ANSWERS ARE NOT NEEDED, USE (CR) FOR UNUSED QUESTION NUMBERS.

QUESTION #2 WHICH IS NOT A HAMMER.
ANSWER #1CLAW
ANSWER #2BALLPEEN
ANSWER #3NAILBAR
ANSWER #4TACK

GIVE THE NUMBER OF THE CORRECT ANSWER. ? 3

YOU HAVE WRITTEN 2 QUESTIONS AND THEY ARE STORED UNDER FILE NAME OF TEST-1. TO GIVE THE TEST, USE PROGRAM TITLED ** TEST TIME **

*** THE END ***

THE PROGRAM:

```
                                - TEST CREATE -
 10 ' STORE AS "TEST-CRE"
 15 ' JOHN LYMAN       KENNEDY HIGH SCHOOL       CEDAR RAPIDS, IA.
       6/24/80
 18 GOSUB 20000
 20 PRINTTAB(32)"** TEST CREATE **"
 25 PRINT:PRINT:GOSUB 15000
 30 PRINT"  TESTS CAN BE CREATED USING THIS PROGRAM FOR ANY
       SUBJECT USING"
 40 PRINT "THE FORMAT SET FORTH BELOW.  (CR) MEANS CARRIAGE
       RETURN"
 45 GOSUB 15000
 50 PRINT:PRINT:PRINT:INPUT"TEST NAME  (8 CHARACTERS & SPACES
       ONLY)";T$
 55 IF T$="TEST-CRE" THEN GOTO 50
 60 GOSUB 10000
 65 GOSUB 16000
 74 PRINT
 75 GOSUB 15000
 80 PRINT"BOTH TRUE-FALSE AND MULTIPLE CHOICE QUESTIONS CAN
       BE WRITTEN WITH"
 90 PRINT "THIS TEST GENERATOR.  PLEASE SPECIFY THE NUMBER OF
       EACH BELOW.  IF"
100 PRINT"THE QUESTIONS ARE OF ONE KIND ONLY, THEN INDICATE
       WITH THE PROPER "
110 PRINT"NUMBER OF QUESTIONS FOR THAT KIND ONLY DEPRESS (CR)
       FOR OTHERS."
115 GOSUB 15000
120 PRINT:INPUT"  NUMBER OF QUESTIONS TRUE-FALSE";NT
130 PRINT:INPUT"  NUMBER OF QUESTIONS MULTIPLE CHOICE";NM
140 PRINT:GOSUB15000
150 PRINT"  SELECT THE TYPE OF QUESTIONS YOU WISH TO HAVE
       FIRST.  IF THE QUESTIONS"
160 PRINT" ARE ALL OF THE SAME TYPE, SELECT THOSE FIRST."
170 GOSUB15000
180 PRINT:PRINT"    (1)  TRUE-FALSE"
190 PRINT"    (2)  MULTIPLE CHOICE"
200 PRINT:INPUT" YOUR SELECTION BY NO. - ";QF
210 IF QF=1 THEN K=1:L=NT:U=(NT+1):R=NM+NT:GOTO 6000
220 IF QF=1 THEN K=(NM+1):L=NT+NM:U=1:R=NM:GOTO 8000
5000 PRINT:PRINT:PRINT
5005 GET 1,1:E=(NT+NM+1):LSET E$=MKI$(E):PUT 1,1
5010 GOSUB15000
5020 PRINT"  YOU HAVE WRITTEN "(NT+MN)"QUESTIONS AND THEY ARE
       STORED UNDER FILE"
5030 PRINT"NAME OF "T$".  TO GIVE THE TEST, USE PROGRAM TITLED
       ** TEST TIME **"
5040 GOSUB15000
5050 PRINT:PRINT"                  *** THE END***"
5060 CLOSE:     END
6000 ' T-F QUES WRITE
6010 GOSUB 15000
```

```
6020 PRINT:PRINT"  YOU CAN NOW PROCEED TO WRITE "NT"TRUE-FALSE
     QUESTIONS.  YOU MAY"
6030 PRINT"USE 110 CHARACTERS AND SPACES TO MAKE UP YOUR
     QUESTIONS.  IF YOU EXCEED"
6040 PRINT"THIS NUMBER, YOU WILL BE ASKED TO REWRITE THE
     QUESTION.  INSERT THE "
6050 PRINT"CORRECT ANSWER FOR THE QUESTION AS CALLED FOR"
6060 GOSUB15000
6070 FOR I=K TO L
6075 GET1,(I+1)
6077 H$="TF":LSET G$=H$
6080 PRINT:PRINT:PRINT"QUESTION NO. "I"          ";:LINEINPUT Q$
6090 IF LEN(Q$)>110 THEN 6080
6095 LSET TQ$=Q$
6100 PRINT:PRINT:INPUT"ANSWER - T OR F ";AN$
6120 LSET A$=AN$
6125 PUT 1,(I+1):IF J=1THEN 16010
6140 NEXT I
6150 IF QF=1 THEN 8000 ELSE 5000
8000 ' MULTIPLE CHOICE QUES
8005 IF NM=0 THEN 5000
8010 PRINT:PRINT
8020 GOSUB 15000
8030 PRINT"  YOU CAN NOW PROCEED TO WRITE "NM"MULTIPLE CHOICE
     QUESTIONS.  YOU MAY"
8040 PRINT"USE 75 CHARACTERS AND SPACES FOR YOUR QUESTION.  IF
     YOU EXCEED THIS "
8050 PRINT"NUMBER, YOU WILL BE ASKED TO REWRITE THE QUESTION.
     ALSO LIST UP TO 4"
8060 PRINT"MULTIPLE CHOICE ANSWERS.  EACH OF THESE SHOULD BE
     ONLY 10 CHARACTERS"
8070 PRINT"LONG. THE NUMBER OF THE CORRECT ANSWER SHOULD BE
     ENTERED AS CALLED FOR."
8075 PRINT"  IF 4 MULTIPLE CHOICE ANSWERS ARE NOT NEEDED, USE
     (CR) FOR UNUSED"
8077 PRINT"QUESTION NUMBERS."
8080 GOSUB 15000
8090 FOR I=U TO R
8095 GET 1,(I+1)
8097 H$="MC":LSETG$=H$
8100 PRINT:PRINT:PRINT"QUESTION #"I"          ";:LINEINPUTQ$
8110 IF LEN(Q$)>75 THEN 8100
8120 LSET MQ$=Q$
8230 PUT 1,(I+1)
8250 LINEINPUT "ANSWER #1";M1$
8251 IF LEN:M1$)>10 THEN? "TOO LONG":GOTO 8250
8252 LSET W$=M1$
8254 LINE INPUT"ANSWER #2";M2$
8255 IF LEN(M2$)>10 THEN? "TOO LONG": GOTO 8254
8256 LSET X$=M2$
8258 LINEINPUT"ANSWER #3";M3$
8259 IF LEN(M3$)>10 THEN? "TOO LONG": GOTO 8258
```

```
 8260 LSET Y$=M3$
 8262 LINEINPUT "ANSWER #4";M4$
 8263 IF LEN(M4$)>10 THEN? "TOO LONG": GOTO 8262
 8264 LSET Z$=M4$
 8266 PRINT:INPUT "GIVE THE NUMBER OF THE CORRECT ANSWER.";B$
 8268 LSET A$=B$
 8270 PUT 1,(I+1):IF J=1 THEN 16010
 8290 NEXT I
 8300 IF QF=2 THEN 6000ELSE5000
10000 OPEN"R",1,T$
10010 FIELD 1,2AS E$
10020 FIELD 1,110AS TQ$,2AS A$
10030 FIELD 1,75AS MQ$,10AS W$,10AS X$,10AS Y$,10AS Z$,2AS G$
10040 RETURN
15000 PRINT "-----------------------------------------------------------------------------"
15010 RETURN
16000 ' EDIT QUES.
16010 PRINT:PRINT:PRINT"    (N)  ENTER NEW QUESTION"
16011 PRINT"    (O)  EDIT OLD QUESTIONS"
16013 PRINT"    (F)  FINISHED"
16020 INPUT N$:IF N$="N" THEN RETURN
16025 IF N$="F" THEN 5000
16027 IF N$<>"O" THEN 16000
16040 PRINT:PRINT:INPUT"DO YOU WISH TO SEE ALL OF THE QUESTIONS
      IN THE FILE";J$
16050 IF LEFT$(J$,1)="Y" THEN 16100 ELSE 16053
16053 PRINT:PRINT:INPUT"WHAT IS THE QUESTION NO. YOU WANT TO
      EDIT";P
16055 IF P=0 THEN RETURN
16060 J=1
16070 GET 1,(P+1):I=P
16075 IF G$="MC"THEN GOTO 16094
16080 PRINT:PRINT"QUESTION #"P:
16090 PRINT"    "TQ$
16092 PRINT"CORRECT ANSWER IS - "A$: GOTO 6080
16094 PRINT"QUESTION #"P
16095 PRINT"    "MQ$
16096 PRINT"    1."W$
16097 PRINT"    2. "X$
16098 PRINT"    3. "Y$
16099 PRINT"    4. "Z$"   CORRECT ANSWER IS "A$:IF G$="MC"THEN
      8100 ELSE 6080
16100 PRINT:PRINT:GOSUB 15000
16110 PRINT"  THIS SECTION WILL GO THRU THE FILE & READ ALL OF THE
      QUESTIONS."
16120 PRINT"YOU WILL NEED TO NOTE THE QUESTION NO.  AND TYPE OF
      QUESTION FOR EDITING."
16130 PRINT"TO CONTINUE THE QUESTIONS SCROLLING AFTER THEY STOP,
      DEPRESS (CR)."
16155 GOSUB 15000
16157 PRINT:PRINT:PRINTTAB(27)T$
16158 PRINT:PRINT:PRINT
```

```
16160 GET1,1:E=CVI(E$)
16165 W=1
16168 PRINT"**********************************************************************"
16170 FOR I=2TOE
16180 GET1,I
16260 IF G$="MC"THEN GOTO 17100
17000 PRINT"#"I-1"    "TQ$
17010 PRINT"THE CORRECT ANSWER IS - "A$
17020 GOTO 17300
17100 PRINT"#"I-1"    "MQ$
17110 PRINT"    1. "W$
17120 PRINT"    2. "X$
17130 PRINT"    3. "Y$
17140 PRINT"    4. "Z$
17150 PRINT"THE CORRECT ANSWER IS - "A$
17300 IF W>3 THEN INPUTV$:PRINT"DEPRESS (CR) TO CONTINUE" IF
      ASC (V$)>0 THEN 17310
17305 PRINT:PRINT"============================="
17310 NEXT I
17350 GOTO 16000
20000 FOR X=1TO20:PRINTCHR$(10):NEXT X
20010 RETURN
READY!
```

- TEST TIME -

```
 10 ' STORE UNDER TEST-TI  6/27/80
 20 PRINTTAB(27)"** TEST TIME **"
 30 PRINT:PRINT:PRINT
 40 GOSUB 15000
 50 PRINT"  TO TAKE THIS TEST, YOU WILL NEED TO FIRST SET SOME
       GUIDELINES."
 60 PRINT"ANSWER THE FOLLOWING QUESTIONS AS THEY COME ON
       YOUR SCREEN."
 70 PRINT
 80 INPUT"  NAME OF TEST TO BE TAKEN ";T$
 90 LINEINPUT"  YOUR NAME ";N$
100 INPUT"  THEN DATE (DAY/MON/YR) ";DA$
110 PRINT:PRINT"  YOU ARE NOW READY TO TAKE THE TEST.  ANSWER
       THE QUESTIONS WITH"
120 PRINT"EITHER A NUMBER OF A LETTER (T) OR (F). AFTER YOU
       ANSWER THE QUESTION,"
130 PRINT"DEPRESS THE 'RETURN' BAR TO ADVANCE THE QUESTIONS.
       BEGIN."
140 GOSUB 15000
145 GOSUB 14000
150 GET 1,1
160 E=CVI(E$)
165 W=0
170 FOR I=2 TO E
180 GET 1,I
190 IF G$="MC"THEN GOTO 230
200 PRINT"QUESTION #"I-1"  "TQ$
210 INPUT"ANSWER IS - ";K$
215 IF VAL(K$)=VAL(A$) THEN W=W+1
220 GOTO 300
230 PRINT"QUESTION #"I-1"  "MQ$
240 PRINT"    1.  "W$
250 PRINT"    2.  "X$
260 PRINT"    3.  "Y$
270 PRINT"    4.  "Z$
280 INPUT"ANSWER IS"; C$
290 IF VAL(C$)=VAL(A$) THEN W=W+1
300 NEXT I
310 PRINT:PRINT:PRINT" YOU ARE NOW FINISHED WITH THE TEST.  I
       HOPE YOU DID WELL."
320 PRINT:PRINT"          YOUR SCORE IS "W" CORRECT FOR "W/(E-1)*
       100"%"
400 CLOSE:END:UNLOAD
14000 OPEN"R",1,T$
14010 FIELD 1,2AS E$
14020 FIELD 1,110AS TQ$,2AS A$
14030 FIELD 1,75AS MQ$,10AS W$,10AS X$,10AS #$,10AS Z$,2AS G$
14050 RETURN
15000 PRINT"-------------------------------------------------------------------------------"
15010 RETURN
READY!
```


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*** TRADE & INDUSTRY FILE ***

COMPUTER: O.S.I. C2-4P; Informer

LANGUAGE: Microsoft BASIC; Informer BASIC

AUTHOR: John Lyman
Kennedy High School
Cedar Rapids, Iowa

APPLICATIONS: Instructional Management

INTRODUCTION: The "Trade & Industry" program is for keeping record of students and employers who are currently, or who have been, enrolled in the Trade & Industry curriculum. The file lists the following: student's name; student's address; student's phone; job title; taxonomy #; employer's name; employer's address and employer's phone.

This program is designed to provide formatted output on a printer so a list of students could be placed in a notebook for teacher use or for future reports.

THE PROGRAM:

```
    5 REM J.F.KENNEDY IND. ARTS DEPT. MAY 23, 1980
    6 PRINT"                ******************************":PRINT
   10 PRINT"                    TRADE & INDUSTRY"
   20 PRINT:PRINT"                 STUDENT - EMPLOYER FILE"
   30 PRINT:PRINT"                   KENNEDY HIGH SCHOOL"
   40 PRINT"                  Cedar Rapids"
   41 PRINT"                   Iowa"
   44 PRINT:PRINT"                ******************************"
   45 DISK OPEN,6,"ST-EM"
   46 FOR I=1TO 4:PRINTCHR$(12):NEXT
   50 PRINT:PRINT:PRINT"  SELECT FUNCTION BY NUMBER"
   55 PRINT:PRINT"     (1)  PRINT FILE"
   60 PRINT"     (2)  WRITE NEW ENTRY"
   65 PRINT"     (3)  EDIT OLD ENTRY"
   75 PRINT"     (4)  FINISHED"
  100 INPUT X
  110 ON X GOTO 1000,2000,3000,4000
 1000 REM READ FILE
 1010 PRINT:PRINT"  THIS SECTION WILL PRINT A LIST OF STUDENTS &
      EMPLOYERS"
 1011 PRINT"EITHER INDIVIDUALLY OR AS A GROUP.  SELECT YOUR
      FUNCTION"
 1012 PRINT"  (1) INDIVIDUAL RECORD"
 1013 PRINT"  (2) ALL RECORDS"
 1020 INPUT Y
 1030 IF Y=1THENGOTO12000
 1032 GOSUB13000
 1034 R=1
 1035 DISK GET,0:INPUT #6,E$:E=VAL(E$)
```

```
1036 FOR I=1TO E-1
1037 DISKGET,I
1038 IF Q=1THEN 1060
1040 FOR U=1TO25:PRINTCHR$(12):NEXT
1060 INPUT #6,N$,SA$,SP$,J$,FD$,EN$,EA$,EP$
1065 GOSUB 15000
1070 PRINT:PRINT"  STUDENT EMPLOYEE --"N$
1072 PRINT:PRINT"  STUDENT ADDRESS --"SA$
1074 PRINT:PRINT"  STUDENT PHONE --"SP$
1080 PRINT:PRINT" JOB TITLE --"J$
1085 PRINT:PRINT" TAXONOMY # --"FD$
1090 PRINT:PRINT" EMPLOYER --"EN$
1100 PRINT:PRINT"  EMPLOYER ADDRESS --"EA$
1110 PRINT:PRINT"  EMPLOYER PHONE -- "EP$
1114 R=R+1
1115 GOSUB 15000
1118 IF R>3THENR=1:GOSUB13060
1120 IF Q=1THEN 1124
1123 INPUT"TYPE A 'C' TO CONTINUE";W$:IF W$<>"C"GOTO1123
1124 IF T=3 THEN GOSUB 13060
1125 NEXT I
1140 DISK!"IO ,02":Q=0:GOTO 50
2000 PRINT:PRINT"  YOU CAN WRITE A NEW EMPLOYEE-EMPLOYER FILE
       BY FOLLOWING"
2010 PRINT"THE INSTRUCTIONS."
2020 DISK GET,0:INPUT#6,E$:E=VAL(E$)
2025 IF T=1THENE=1
2030 DISK GET,E
2035 PRINT"ENTRY #"E
2040 PRINT:INPUT"  NAME OF STUDENT EMPLOYEE";N$
2041 IF LEN(N$)>16THENPRINT"TOO MANY CHARACTERS":GOTO 2040
2042 PRINT:INPUT"  STUDENT ADDRESS";SA$
2043 IF LEN(SA$)>22THENPRINT"TOO MANY CHARACTERS";:GOTO 2042
2045 PRINT:INPUT"  STUDENT PHONE";SP$
2046 IF LEN(SP$)>8THENPRINT"TOO MANY CHARACTERS":GOTO 2045
2050 PRINT:INPUT"  JOB TITLE";J$
2051 IF LEN(J$)>16THENPRINT"TOO MANY CHARACTERS":GOTO 2050
2055 PRINT:INPUT"  TAXONOMY # ";FD$
2056 IF LEN(FD$)>11THENPRINT"TOO MANY CHARACTERS":GOTO 2055
2060 PRINT:INPUT"  EMPLOYER ";EN$
2061 IF LEN(EN$)>14THENPRINT"TOO MANY CHARACTERS":GOTO 2060
2070 PRINT:INPUT"  EMPLOYER ADDRESS ";EA$
2071 IF LEN(EA$)>22THENPRINT"TOO MANY CHARACTERS":GOTO 2070
2080 PRINT:INPUT" EMPLOYER PHONE ";EP$
2081 IF LEN(EP$)>8THENPRINT"TOO MANY CHARACTERS";GOTO 2080
2095 PRINT#6,N$:PRINT#6,SA$:PRINT#6,SP$:PRINT#6,J$:PRINT#6,FD$
2096 PRINT#6,EN$:PRINT#6,EA$:PRINT#6,EP$
2100 DISK PUT
2102 DISK GET,0:E=E+1:E$=STR$(E):PRINT#6,E$:DISK PUT
2110 GOTO 50
3000 REM EDIT RECORDS
```

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3010 PRINT"     THIS SECTION WILL ALLOW YOU TO EDIT A CURRENT
       RECORD."
3020 PRINT"YOU WILL HAVE TO WRITE THE ENTIRE RECORD AGAIN."
3025 T=1
3030 GOSUB 12000
4000 END
10000 DISK!"IO ,QA":Q=1
10010 RETURN
12000 PRINT:INPUT"GIVE FIRST & LAST NAME OF STUDENT";SN$
12010 DISKGET,0:INPUT#6,E$:E=VAL(E$)
12020 FOR I=1TOE-1
12025 DISK GET,I
12030 INPUT#6,N$
12032 IF SN$=N$AND T=1 THEN 2025
12033 IF SN$=N$THEN 1037
12040 NEXT I
12050 PRINT:PRINT" SORRY, NAME NOT IN FILE":GOTO 50
13000 PRINT:INPUT"  PRINT COPY  (Y OR NO)";R$
13010 IF R$="Y" THEN DISK!"IO ,QA"
13020 IF R$="Y"THEN 13050
13025 RETURN
13050 FOR U=1TO3:PRINTCHR$(12):NEXT U:Q=1:T=3:RETURN
13060 FOR P=1TO3:PRINTCHR$(12):NEXT P
13065 IF I=E-1 THEN 1140
13070 RETURN
15000 PRINT"-----------------------------------------------------------------------------------------"
15010 RETURN
```